INTRODUCTION

The Great Lakes Binational Toxics Strategy: A Canada-United States Strategy for the Virtual Elimination of Persistent Toxic Substances (hereafter the GLBTS) was conceived in response to the International Joint Commission's (IJC) 1994 Seventh Biennial Report on Great Lakes Water Quality. The IJC, an independent body of government-appointed commissioners with the responsibility to assist and evaluate U.S. and Canadian efforts under the Great Lakes Water Quality Agreement (GLWQA), called upon the two governments to "…adopt a specific, coordinated strategy within two years with a common set of objectives and procedures for action to stop the input of persistent toxic substances into the Great Lakes environment." Signed in 1997, the GLBTS is an agreement between Canada and the United States to virtually eliminate persistent toxic substances from the Great Lakes environment.

This past year, 2003, saw continued use and emissions reductions of key level I persistent toxic substances. Of seventeen GLBTS reduction goals set forth for the twelve level I persistent toxic substances in April 1997, nine have been met, four will be met by the target timeline date of 2006, and the remaining four will be well advanced toward meeting their targets by 2006. See Appendix B for a list of GLBTS reduction goal targets and their current status.

Environment Canada (EC), the United States Environmental Protection Agency (US EPA), and stakeholders from industry, academia, state/provincial and local governments, Tribes, First Nations, and environmental and community groups have worked together toward the achievement of the Strategy's challenge goals. The GLBTS is a binational partnership agreement between Canada and the U.S., which commits to the reduction and virtual elimination of persistent toxic substances from the Great Lakes Basin through pollution prevention and toxic reduction activities. Many dedicated stakeholders on both sides of the border have joined in this partnership to help preserve and protect an invaluable ecosystem that comprises over 20% of all fresh water worldwide, and over 90% of the fresh water in North America.

GLBTS Level I substances are mercury, polychlorinated biphenyls (PCBs), dioxins/furans, hexachlorobenzene (HCB), benzo(a)pyrene (B(a)P), octachlorostyrene (OCS), alkyl-lead, aldrin/dieldrin, mirex, chlordane, toxaphene, and DDT. These are linked to or have the potential to cause detrimental environmental impacts in the Great Lakes Basin. These substances occur in the water, sediment, or aquatic biota of the Great Lakes ecosystem and exert, singly or in a synergistic or additive combination, a toxic effect on aquatic, animal, or human life. They represent the immediate priority for virtual elimination through pollution prevention and other actions that will phase out their use, generation, or release in a cost-effective manner.

About This Report

This report represents a comprehensive summary of activities and accomplishments under the GLBTS for the year 2003. Chapters 1 through 4 present highlights of active substance workgroups for mercury, PCBs, dioxins/furans, and HCB/B(a)P, respectively, including a review of major projects and progress in source reductions toward each of the interim challenge goals on both sides of the border. Chapter 5 provides a synopsis of the four quarterly Integration Workgroup meetings and the two semi-annual Stakeholder Forum meetings, including a summary of presentations, policy discussions, and key decisions. Chapter 6 presents a summary of activities by some of the key stakeholders in the GLBTS. Chapter 7 provides a detailed account of sediment remediation projects to date, including an estimate of volumes remediated or capped and the remaining volumes of contaminated sediments in specific Areas of Concern in the basin. Chapter 8 presents a synopsis of the Long Range Transport Workshop held in September 2003 in Ann Arbor, Michigan. A summary of highlights from each chapter is provided below.

Mercury

The U.S. has met and exceeded its national mercury use reduction goal of 50% (from a 1990 baseline). Progress toward the national mercury emissions reduction goal of 50% (from a 1995 baseline) currently stands at 40% and should be met by 2006. Canadian progress toward a 90% reduction (from a 1988 baseline) of releases into the Great Lakes Basin is well advanced, and currently stands at 83%. Some noteworthy mercury reduction activities in 2003 included the following:

- Ontario passed the Existing Hospitals Regulation requiring all hospital incinerators to close by December 6, 2003;
- Ontario also passed Regulation 196/03 requiring all dental offices in which dental amalgam is placed, repaired, or removed to properly install dental amalgam separators.
- In the U.S., Hospitals for a Healthy Environment continued to recruit new partners and is now comprised of 474 partners, representing 1,936 facilities.

- The Chlorine Institute released its Sixth Annual Report to EPA, showing a 74% capacity-adjusted reduction in mercury consumption between 1995 and 2002, far surpassing its commitment of a 50% reduction by 2005.
- The Alliance of Auto Manufacturers reported in 2003 that the use of mercury switches in motor vehicles ended in December 2002, representing 97% of all mercury that was contained in cars and light trucks.

PCBs

As of March 2003, Canada reported that 85% of high-level PCB wastes had been destroyed, compared to a reduction target of 90%. This is up from 40% in 1998, when the work of the GLBTS commenced. Estimates from US EPA data indicate that 44% of PCB transformers and 10% of PCB capacitors were disposed of between the 1994 baseline and the end of 2002, compared to a reduction goal of 90% by 2006 for each. However, the US EPA expects the actual amount of PCB equipment remaining in use to be much less, and the reductions achieved much greater. Some noteworthy activities in 2003 include the following:

- The US EPA funded an expansion of the PCB outreach and phase-out solicitation campaign, which will enable additional facilities to be reached and provide for additional follow-up;
- The Minnesota Pollution Control Agency continued to work with municipalities and rural electric cooperatives to identify and categorize almost 7,000 transformers suspected of containing PCBs;
- EC developed the GLBTS PCB Newsletter that is being used to promote PCB elimination and award programs;
- In September 2003, at the GLBTS Integration Workgroup meeting in Toronto, the first four Canadian award plaques were presented to Hydro One, Stelpipe, Slater Steel, and Enersource Hydro, Mississauga, for their excellent accomplishments in phasing out PCBs;
- Canadian federal PCB databases can now be accessed and read from the Green Lane website (http://www.ec.gc.ca/PCBDatabase/); and,
- Four Government of Canada PCB regulations are being amended and targeted for Canada Gazette publication in 2004.

Dioxins/Furans

The U.S. and Canada are well advanced toward meeting their respective dioxin/furan emission reduction goals of 75% and 90%. The U.S. projects a 92% reduction in nationwide releases of dioxins and furans by the end of 2004. Canada, which has achieved a 79% reduction, expects to meet its target by 2005, consistent with its commitment under the Canada-Ontario Agreement with Respect to the Great Lakes Basin Ecosystem. Both countries undertook several noteworthy actions in the past year, including the following:

Showey Lady Slipper
Shell Preserve, Hammond, Indiana
Photo by Karen Holland, US EPA

- The Burn Barrel subgroup assisted the US EPA in developing a national website related to backyard burning (www.epa.gov/msw/backyard), which contains information on environmental and health risks, state rules, and outreach brochures directed at government officials and residents;
- EC conducted a national landfill study under the Canada-wide Standards process and concluded that, of 928 landfill sites in Northern Ontario, 1-3% are burning waste that generates 0.5-1.5 grams TEQ/year;
- In 2003, dioxin and furan sampling commenced at the Integration Atmospheric Deposition Network site at Burnt Island; and
- Dioxin/furan data for the U.S. Toxics Release Inventory (TRI) and the Canadian National Pollutant Release Inventory were publicly reported for the first time.

HCB/B(a)P

Canadian reductions in HCB and B(a)P emissions are well advanced at 65% and 48%, respectively, against a 90% goal (compared to a 1988 baseline). U.S. emissions reductions are also well advanced against unspecified reduction goals, with a 90% reduction in HCB from chlorinated solvents and pesticide manufacturing, a 65% reduction in B(a)P from coke ovens, and a 90% reduction in B(a)P from aluminum reduction plants and petroleum refineries. Some noteworthy activities occurring in 2003 included:

- The Canadian Burn-it-Smart! program, which uses expert speakers to promote low-emitting stoves, the use of proper fuel, and other health and safety aspects of wood burning through community workshops (60 Burn-it-Smart! workshops were held in 32 communities this past year);
- The US EPA initiated a "Voluntary Woodstove/Fireplace Smoke Reduction Activities and Outreach Materials" program to encourage switching to gas and EPA-certified stoves and encourage best practices for the operation of woodstoves and fireplaces;

- The US EPA and the Rubber Manufacturers Association began working on scrap tire mitigation efforts, including creating an ad hoc group of industry experts to address the issue of stockpile abatement, and developing a revised version of a tire fire prevention/fire fighting training program.
- Also, the US EPA issued a rule to control emissions of toxic air pollutants during hydrochloric acid production, which is expected to reduce HCB emissions; and
- Several U.S. chemical companies made significant reductions in their HCB emissions, as reported in the most recent (2001) TRI.
- Four integrated steel mills in Ontario committed to a 60% reduction in PAH/B(a)P emissions from coke-making operations by 2005 (from a 1993 baseline).

Integration Workgroup and Stakeholder Forum Meetings

The Integration Workgroup met four times in 2003: twice in Windsor (February 25th and May 15th), once in Toronto (September 11th), and once in Chicago (December 17th). The semi-annual Stakeholder Forum meetings were also held in Windsor (May 14th) and in Chicago (December 16th). A major theme in this past year's meetings was to develop a review process for GLBTS Level I substances that is intended to evaluate next steps beyond 2006. During the year, a subgroup of the Integration Workgroup developed a management framework that identifies a series of key questions, data and other technical needs, long term objectives, and other management options. The purpose of the framework is to provide guidance as to how the GLBTS can continue to provide value and effect further reductions in Level I substances beyond the current interim challenge goals. The coming year will focus on planning implementation of this framework. Other important cross-cutting topics discussed in 2003 included long range transport of airborne toxic substances, the integration of communications and outreach on toxics issues with Lake-wide Management Plan stakeholders, and technology diffusion in the Great Lakes Basin.

The two Stakeholder Forum meetings included keynote topics on the Great Lakes Legacy Act, long range transport of North American toxic substances, the North American Commission on Environmental Cooperation's Sound Management of Chemicals program, the United Nations Environmental Program (UNEP) for persistent organic pollutants (POPs), and a study of historical levels of dioxin in Lake Ontario lake trout.

Partners at Work

Chapter 6 presents a few examples of the excellent work undertaken by GLBTS stakeholders in 2003 to reduce the use and release of persistent toxic substances in the Great Lakes Basin. A few examples include:

- The Canadian Centre for Pollution Prevention (C2P2) developed the Municipal Management Tool for Integrated Plant Health Care and Pesticide Reduction;
- C2P2 also initiated a contract with organic-certified food vendors for the 2003 Canadian Pollution Prevention Roundtable to promote non-pesticide grown foods; and
- INFORM Inc.'s "Purchasing for Pollution Prevention Project" helped the states of Minnesota, New York, and Wisconsin substitute persistent, bioaccumulative and toxic (PBT)-containing products for products devoid of mercury, lead, and other PBTs, such as mercury-free medical supplies.

Sediments Challenge

Chapter 7 provides an update on the efforts of the US EPA and EC to remediate contaminated sediments from the Great Lakes Basin. The following summarizes those efforts:

- In 2002, approximately 183,000 cubic yards of sediment were remediated from the following sites around the Lakes: U.S.S. Lead Refinery, Inc.; St. Clair Shores; US Steel - Gary Works; Moss-American; Pine River; Tannery Bay; and St. Clair River at Sarnia.
- The cumulative volume of sediments remediated at U.S. sites since 1997 is approximately 2.4 million cubic yards.
- In 2003, the US EPA conducted integrated sediment assessment surveys at eight sites, including Black Lagoon, MI; Pere Marquette, MI; Raisin River, MI; Saginaw River, MI; St. Mary's River/Munuscong Lake, MI; Tittabawasse/Saginaw Rivers, MI; Buffalo River, NY; and Ashtabula River, OH.
- In Canada, in 2002, Dow Chemical Canada, Inc. undertook a pilot project to dredge 2,000 cubic metres of contaminated soil adjacent to its plant site at Sarnia, Ontario; the Severn Sound Area of Concern in Ontario was restored; and a sediment remediation strategy for the St. Lawrence River near Cornwall, Ontario, is expected to be finalized.

Long Range Transport Challenge

Chapter 8 provides a summary of the two-day Long Range Transport Workshop held September 16th and 17th, 2003, in Ann Arbor, Michigan. With a focus on the atmospheric pathway of toxic substances to the Great Lakes, approximately 70 experts from around the world convened to discuss and disseminate the latest information on international emissions, monitoring, and modeling of Level I and Level II substances from local, regional, continental, and global sources to the Great Lakes. A draft summary of the workshop is available at http://www.delta-institute.org/pollprev/lrtworkshop/open.html. Additionally, two Canadian modeling efforts are presented in this chapter: 1) Impacts of Lindane Usage in the Canadian Prairies on the gamma-HCH Loadings to the Great Lakes Ecosystem (J. Ma and S.M. Daggupaty, Air Quality Research Branch, Meteorological Service of Canada, EC), and 2) Global/Regional Atmospheric Heavy

Metal Model (GRAHM) - Update (A.P. Dastoor, Air Quality Research Branch, Meteorological Service of Canada, EC).

Looking Ahead

This is an exciting time to be involved in the efforts to reduce persistent toxic substances. The GLBTS is positioned to assist with the implementation of the UNEP POPs treaty, expected to be ratified in 2004; and pilot projects which flow from the GLBTS substance workgroups are being taken up by larger national and international fora, such as the burn barrel campaigns in the upper-Midwest, which are now of a national scope in Canada and the U.S.

This coming year, 2004, GLBTS stakeholders will continue the work of reducing persistent toxic substances in the Great Lakes. In anticipation of a full review of the GLBTS program, the US EPA and EC will prepare and determine next steps for 2006. Efforts will include the review of Level I substances mentioned in Chapter 5 as well as a re-examination of Level II substances and new chemicals that may be impacting the current health and well being of the Great Lakes ecosystem. To continue the momentum, another key challenge for 2004 will be to improve communications with Lakewide Management Plans (LaMPs) and statewide technical assistance providers and to increase outreach in the Great Lakes Basin to key sectors, such as publicly owned treatment works and municipalities.

The key question and challenge before GLBTS stakeholders today is, "How much of a difference can this unique binational multi-stakeholder forum continue to make in effecting reductions of persistent toxic substances in the Great Lakes Basin through voluntary measures?" The answer will depend, in large part, on the continued commitment, diligence, and creativity of all concerned. Working with the aforementioned and other interested stakeholders, as well as with national and international fora, the GLBTS looks forward to continuing its mission well into the future.

For further information on the Great Lakes Binational Toxics Strategy contact:

Gary V. Gulezian
United States Co-Chair
Director, Great Lakes National Program Office

Danny Epstein
Canadian Co-Chair
Regional Director,
Environmental Protection Branch, Ontario Region
Environment Canada

Alan Waffle
Canadian GLBTS Co-Lead
Environmental Protection Branch, Ontario Region
Environment Canada
(416) 739-5854
alan.waffle@ec.gc.ca

Edwin (Ted) Smith
United States GLBTS Co-Lead
Great Lakes National Program Office
(312) 353-6571
smith.edwin@epa.gov

or access the GLBTS's website at
http://www.binational.net

Swans on Lake Ontario
Photograph by Ashij Kumar

1.0 MERCURY

Canadian Workgroup co-chair: ***Robert Krauel***

U.S. Workgroup co-chair: ***Alexis Cain***

Progress Toward Challenge Goals

U.S. Challenge: Seek by 2006, a 50% reduction nationally in the deliberate use of mercury and a 50% reduction in the release of mercury from sources resulting from human activity.

Canadian Challenge: Seek by 2000, a 90% reduction in the release of mercury, or where warranted the use of mercury, from polluting sources resulting from human activity in the Great Lakes Basin.

U.S. mercury emissions decreased approximately 40% between 1990 and 1999, according to best estimates from the National Emissions Inventory (see Figure 1-1). It is likely that some additional reductions have occurred since 1999, particularly in emissions from municipal waste combustors and medical waste incinerators. Significant reductions in emissions from these sectors had already taken place by 1999, but compliance with emissions regulations for these categories was not required until after 1999. By 2006, additional regulations and voluntary activities are expected to reduce mercury emissions by at least 50%, thereby achieving the reduction challenge.

While U.S. mercury use declined in the late 1990s, progress since 1997 is difficult to gauge quantitatively given changes in the sources of data about mercury consumption. Available data indicate that mercury use declined more than 50% between 1995 and 2001. Much of this decrease is attributable to decreased mercury use by the chlor-alkali industry, which accounted for an estimated 35% of mercury use in 1995. Figure 1-2 provides two different estimates for U.S. mercury use for 2001, in comparison to the Strategy goal of a 50% reduction by 2006 (from a 1995 baseline). In addition to reductions in mercury use by the chlor-alkali industry, reductions have been achieved in the use of mercury for measurement and control and electric devices, dental amalgam, and lamps. These reductions are not visible in Figure 1-2. For instance, mercury contained in lamps sold in the U.S. has declined from approximately 27 tons in 1990 to 17 tons in 1994, 13 tons in 1999, and 9 tons in 2001. Additional mercury is used by the lamp industry in the production process, but not introduced into the lamps, and is not counted in these figures.

In Canada, mercury releases were reduced by 83% between 1988 and 2001. Figure 1-3 illustrates the progress made toward Canada's 90% reduction target. This figure

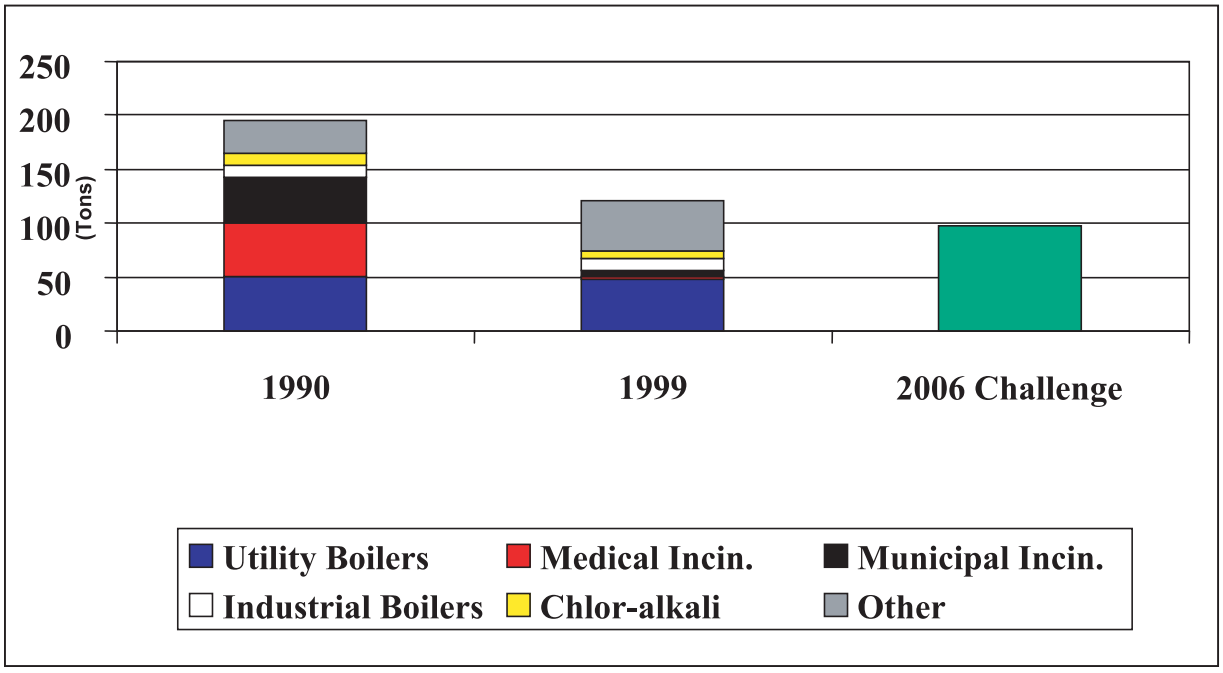


Figure 1-1. U.S. Mercury Emissions: 1990 Baseline, 2006 Challenge[1]

[1] Estimates are based on the 1993 and 1999 National Emissions Inventory data.

shows that releases in Ontario have been cut by more than 11,600 kilograms since 1988, based on Environment Canada's 2001 mercury inventory. Figure 1-4 shows the contribution of sources of mercury release in Ontario.

Workgroup Activities and the 4 Step Process

The Mercury Workgroup has focused on Steps 3 and 4: examining and implementing reduction options, and developing partnerships and commitments. The following draft reports have been posted to the GLBTS website: U.S. Sources and Regulations (Steps 1 and 2), see http://www.epa.gov/glnpo/bns/mercury/stephg.html, and Mercury Reduction Options (Step 3), see http://www.epa.gov/glnpo/bns/mercury/Draft_Report_for_Mercury_Reduction_Options.pdf.

In December 2002, the Mercury Workgroup held a workshop on options for state and local governments to reduce mercury releases from dental offices. A draft "Options Paper" was released to the workgroup, comments were received, and the paper was finalized and distributed to the workgroup in December 2003.

In May 2003, the workgroup investigated environmental trends in mercury concentrations. Due to the persistent nature of mercury, the effects of reduction actions may be delayed in the environment. While mercury emissions in the U.S. decreased between 1990 and 1999, and mercury use also declined in the late 1990s, levels in the environment have not responded correspondingly. For example, Figure 1-5 illustrates mercury deposition data collected through the Mercury Deposition Network (MDN) from 1996 to 2001. The data show no discernible trend in mean weekly mercury deposition over this time period.

Reduction Activities

Numerous mercury reduction activities are occurring in Canada to meet the goal of reducing releases of mercury in the Great Lakes Basin, and in the U.S. to meet the goal of reducing the deliberate use of mercury and releases of mercury nationwide. The following is a selection of activities reported by the Mercury Workgroup participants. (Additional information on recent stakeholder activities is provided in Section 6.0.) Links to websites with additional details about many of these activities can be found at http://www.epa.gov/Region5/air/mercury/mercury.html.

Canadian Reduction Activities

Pollution Probe: In June 2001, Pollution Probe, a Canadian non-profit environmental organization, initiated a switch out program to recover mercury switches from end-of-life vehicles. With funding from the Ontario Power

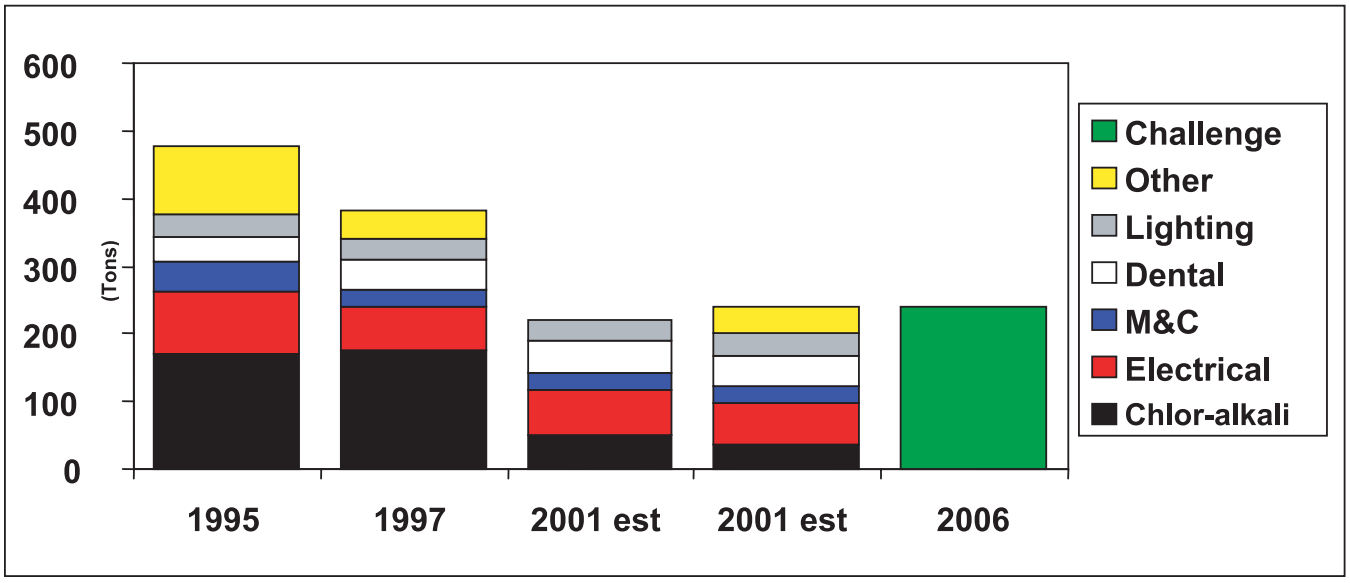


Figure 1-2. U.S. Mercury Use: 1995 Baseline, 2006 Challenge[2]

[2] Estimates for 1995 through 1997 are from the US Geological Survey, 1997 Minerals Yearbook and 1996 Minerals Yearbook, at http://minerals.er.usgs.gov/minerals/pubs/commodity/mercury/. Estimates for 1999 are from Bruce Lawrence, "Sources, Demand, Price and the Impacts of Environmental Regulations," a paper presented at the U.S. Environmental Protection Agency, Office of Research and Development, Workshop on Mercury Products, Processes, Waste, and the Environment: Eliminating, Reducing and Managing Risks for Non-Combustion Sources, Baltimore, March 22, 2000. Estimates for 2001 are from Jeff Johnson, "The Mercury Conundrum," Chemical & Engineering News, February 5, 2001, p.22. Further explanation of this data can be found at http://www.epa.gov/region5/air/mercury/progress.html.

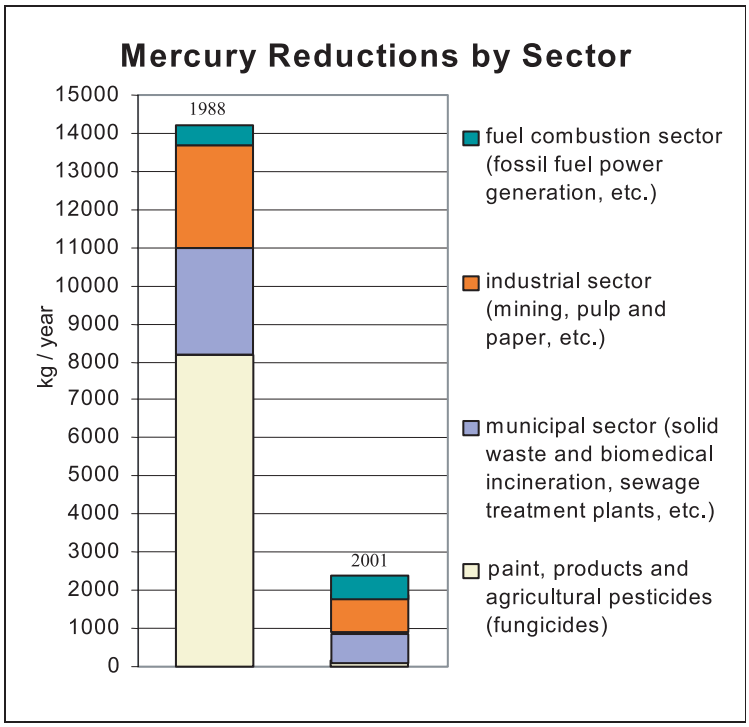


Figure 1-3. Reductions in Mercury Releases in Ontario from 1988 to 2001, by Sector
Source: Environment Canada

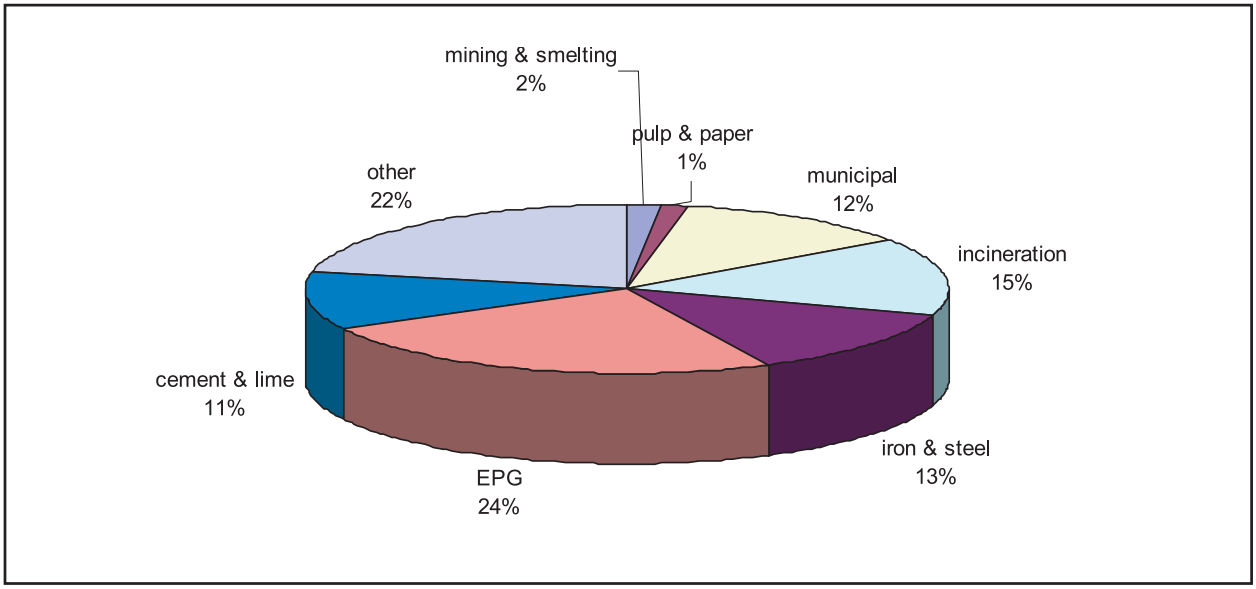


Figure 1-4. Sources of Mercury Releases in Ontario.
Source: Environment Canada

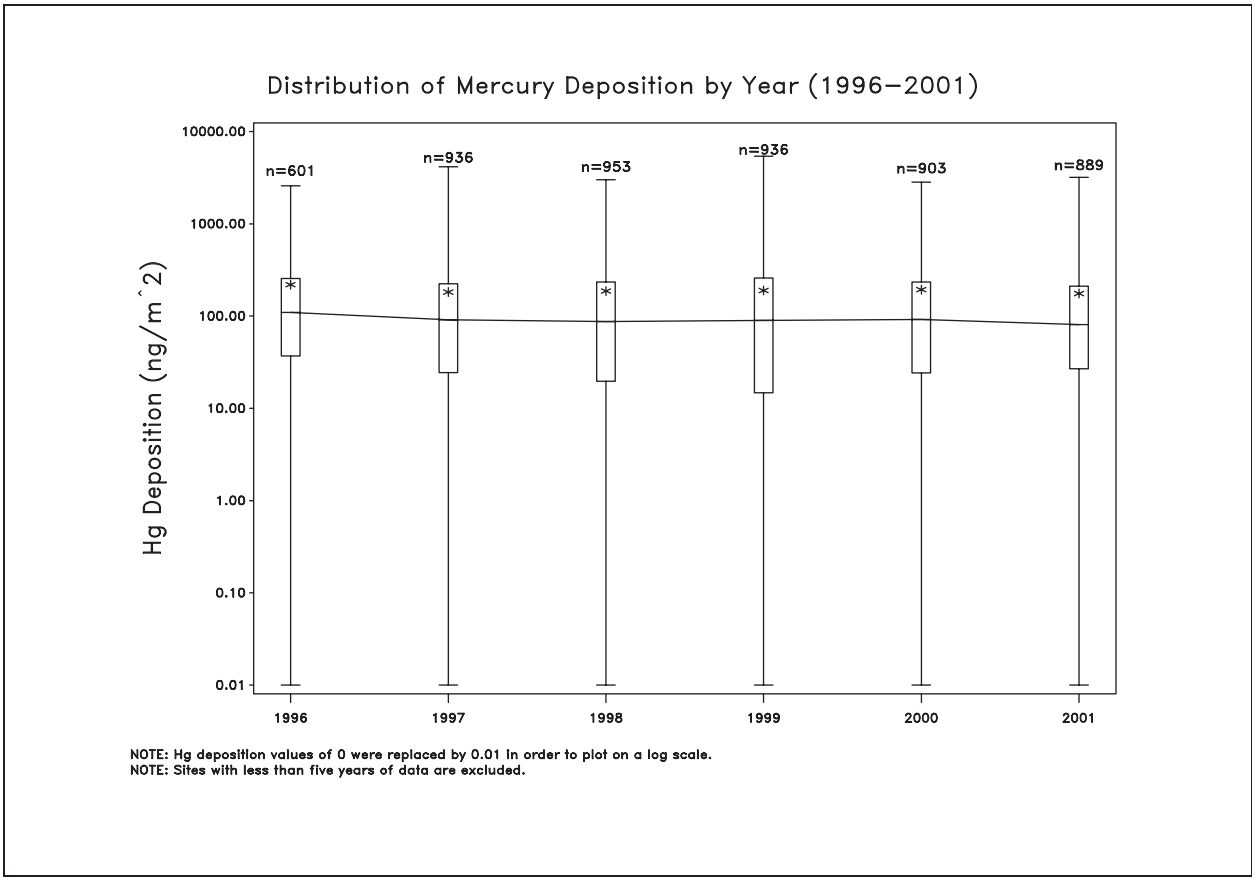


Figure 1-5. Mercury Deposition Data Collected through the Mercury Deposition Network (MDN) from 1996 to 2001. Source: Battelle

Generation, the Ontario Ministry of the Environment, and Environment Canada, and in partnership with the Ontario Automotive Recycling Association, participation in the program has grown from 11 auto dismantlers to over 130 in Ontario. The Merc Switch Out Program has recently expanded to include other provinces in Canada. The program is currently being led by another Canadian non-profit environmental organization, the Clean Air Foundation.

Canadian Centre for Pollution Prevention: The Canadian Centre for Pollution Prevention (C2P2) is a non-profit organization with a number of initiatives in the Canadian healthcare sector related to mercury reduction and elimination. A few initiatives are:

- William Osler Health Care Centre P2 Planning: Under the auspices of the Ontario Centre for Environmental Technology Advancement's Toronto Sustainability Program, C2P2 developed a pollution prevention plan for a 300-bed, full-service Toronto-area hospital. The plan addressed the City of Toronto's Pollution Prevention (P2) planning requirement under the sewer use by-law. In particular, it focused on contaminants that contribute to greenhouse gases and smog, as well as other pollutants, such as mercury.
- Healthcare EnviroNet: C2P2 continues to maintain the Healthcare EnviroNet website (www.c2p2online.com/healthcare) which offers technical resources on pollution prevention (including mercury reduction opportunities) to the healthcare sector. Healthcare EnviroNet services are made possible through the support of Health Canada, Medical Waste Management, the Canadian Coalition for Green Healthcare, and Environment Canada, Ontario Region. The "Greening Healthcare" workshop, sponsored by Environment Canada, Natural Resources Canada, and C2P2, was held in September 2003.

Canadian Coalition for Green Health Care: The Coalition organized seminars on environmental programs, products, and services during the year, and at the Ontario Hospital Association (OHA) annual convention held November 3 to 5, 2003, to encourage health care facilities to implement actions to reduce the use of mercury. The OHA convention program included an exhibit area (the "Green Lane"). The Coalition partnered with six Ontario hospitals, inviting staff, patient families, and visitors to exchange their mercury thermometers from home or office with a safer digital thermometer. Over 1,700 thermometers, two thermostats, two vials of mercury, five blood pressure gauges, and one mercury switch were collected. An estimated 2.5 kg of mercury was collected and safely disposed of.

Ontario Ministry of the Environment: A few initiatives are:

- Ontario Existing Hospitals Regulation: Ontario passed the Existing Hospitals Regulation (O. Reg. 323/02),

requiring all existing hospital incinerators to close by December 6, 2003. Only a few years ago, there were over 70 hospital incinerators. The sector was the fourth largest emitter of mercury in the province. The number has decreased significantly: less than 15 hospital incinerators were operating by the middle of 2003.

- Ontario Dental Regulation: The regulation (196/03) came into effect November 15, 2003. It requires all dental offices in which dental amalgam is placed, repaired, or removed to have a properly installed dental amalgam separator. The Royal College of Dental Surgeons of Ontario administers the regulation.

Dental Waste Management Working Group: The Dental Waste Management working group developed a manual entitled Best Management Practices (BMP), as well as a set of quick reference flowcharts (including one for dental amalgam and mercury wastes). These items are being distributed to all dentists in Ontario. The flowcharts are also posted on several of the websites of the working group members, including the Royal College of Dental Surgeons at www.rcdso.org.

U.S. Reduction Activities

Indiana Mercury Dental Program: The Indiana Department of Environmental Management (IDEM), in partnership with the Indiana Department of Health, the Indiana Dental Association, and the Indiana Solid Waste Management Districts, held an elemental (liquid) mercury sweep for Indiana dentists in early 2003. More than 240 pounds of elemental mercury were collected from 52 dentists around the state. Additionally, IDEM and its partners agreed to work together to create an environmental pledge program for Indiana dentists. The anticipated completion date of the pledge program is late 2003. More information can be found at http://www.in.gov/idem/mercury/programs/dentalmercury.html.

Hospitals for a Healthy Environment: Hospitals for a Healthy Environment (H2E), a joint project of the American Hospital Association, Health Care Without Harm, the American Nurses Association, and the US EPA, is a voluntary program with 474 partners representing 1,936 facilities: 542 hospitals, 1,143 clinics, 52 nursing homes, and 199 other types of facilities. These partners are health care facilities that have pledged to eliminate mercury and reduce waste, consistent with the overall goals of H2E. This program is continuing to grow and has enlisted 139 new partners in the last year.

Air Emissions Regulation: The US EPA took a final rulemaking step to control emissions from waste burning in January 2003, when control standards for small municipal waste combustors were finalized. In addition, mercury emissions reduction requirements were finalized for mercury cell chlor-alkali plants and iron foundries, and have been proposed for industrial boilers.

Indiana Mercury Air Deposition Program: IDEM, in partnership with the U.S. Geological Survey (USGS), set up five mercury air deposition monitoring stations throughout Indiana. Data are being collected for both wet and dry deposition. Mercury released into the air (from both natural sources and human sources such as coal-fired power plants, municipal incinerators, and industrial boilers) is generally transported to the surface of the earth through precipitation. Mercury has been detected at precipitation monitoring stations throughout North America. USGS, in cooperation with IDEM, established and operates the precipitation-monitoring network for mercury in Indiana. This monitoring program is coordinated through the IDEM Mercury Work Group and is funded by the USGS and IDEM's Office of Air Quality and Office of Water Quality. An overview of the IDEM/USGS Monitoring Program and currently available data summaries for the Indiana monitoring network are available at http://www.in.gov/idem/mercury/air/index.html.

Chlorine Industry Voluntary Mercury Reduction Commitment: The Chlorine Institute released its Sixth Annual Report to EPA. The report showed a 74% capacity-adjusted reduction in mercury consumption by the U.S. chlor-alkali industry between 1995 and 2002, exceeding this sector's commitment to reduce mercury use by 50% by 2005. Including shutdowns of mercury cell factories, mercury use has decreased by 81% since 1995. While this industry has reduced mercury consumption and purchases significantly since 1995, the Sixth Annual Report shows no significant change in mercury consumption between 2001 and 2002. Actual mercury purchases by the chlor-alkali industry increased in 2002, because of decisions by some factories to increase the amount of mercury in use within the mercury cells, a change which is expected to increase efficiency and reduce mercury consumption.

Mercury Switches in Motor Vehicles: The Alliance of Auto Manufacturers, a trade association of nine car and light truck manufacturers, reported that the use of mercury switches in motor vehicles in the U.S. ended in December 2002. These switches represented 97% of the mercury that was contained in cars and light trucks. The remaining mercury-containing devices in motor vehicles range from 0.5 mg to 5 mg of mercury, and research is ongoing to find a replacement for the mercury that is used in these components.

Mercury in Auto Scrap: Use of mercury-containing switches in automobiles produced for the North American market ceased with the 2003 model year. Several Great Lakes States are implementing programs to remove mercury switches in existing older cars. A workshop organized by the US EPA Office of Solid Waste in August 2003 brought together States from across the U.S. to discuss implementing programs to address this issue.

Moreover, implementation of clean scrap requirements through a new air emissions standard for iron foundries will require that suppliers of auto scrap to these facilities remove mercury light switches.

Auto Salvage Facility Sector Project: IDEM recently concluded the compliance assistance phase of its auto salvage facility sector project. This phase consisted of 11 compliance assistance workshops held across the state of Indiana. Close to 200 individuals attended these workshops, including facility owners, county agency personnel from health departments, and plan commissioners and staff from several solid waste management districts. PowerPoint presentations for each of the topics covered during the workshops, as well as a copy of the compliance assistance manual, can be obtained by visiting the project website at www.in.gov/idem/autosalvage. The manual provides the auto salvage facility sector with environmental regulatory information (e.g., how to identify and remove mercury-containing switches from vehicles). The project is now set to enter the inspection phase, which will consist of conducting multimedia compliance inspections across the state. Enforcement will be taken as appropriate. It is anticipated that inspections will begin in early November 2003.

Voluntary Mercury Pollution Prevention Initiative: The Voluntary Mercury Pollution Prevention Initiative was signed in September 1998 by ISG Burns Harbor (formerly Bethlehem Steel), Ispat Inland Inc., Indiana Harbor Works, and US Steel Gary Works. Also signatory to the initiative were the Lake Michigan Forum, US EPA Region 5, and the IDEM. The agreement called for the companies to inventory sources of mercury, such as manometers and switches, and to identify replacement/disposal options. The agreement also called for specific action plans and specific reduction goals.

Since the signing of the agreement, these three mills have eliminated over 3,700 pounds of mercury from their plants, and are on target to meet a goal of 90% reduction in mercury in these facilities by 2008. The US EPA and IDEM are now considering using this voluntary initiative as a template for similar programs for other industries and other areas.

In September 2003, the three steel mills received a "Quality of Life" award for their contribution to the quality of life in northwest Indiana due to their mercury reduction efforts. Formed in 1997, the Quality of Life Council promotes comprehensive sustainable development in Lake, Porter and LaPorte Counties, Indiana. In his remarks at the presentation of the award, the mayor of the town of Valparaiso, David Butterfield, said that the award epitomized the goals of the council: economic development, environmental health, and social equity.

Mercury Pollution Prevention at a Bleached Kraft Pulp and Paper Mill: During the 1990's, a pulp and paper manufacturing facility in Cloquet, Minnesota, owned by the Potlatch Corporation, demonstrated mercury reductions through pollution prevention activities. Potlatch first began by identifying mercury-containing products, such as flow meter transmitters, manometers, fluorescent light bulbs, thermostats, thermometers, pressure switches, and batteries. In 1992, Potlatch began replacing mercury-containing products with mercury-free alternatives. Approximately 300 kilograms of elemental mercury have since been captured and recycled from mercury-containing devices at the mill. Potlatch has also implemented steps to ensure that mercury-free products and low mercury feedstock chemicals are purchased.

In 1994, a mill-wide investigation for elemental mercury in open or U-drain sewers was conducted during its annual mill maintenance outage. No elemental mercury was discovered during the investigation. An increase in mercury concentrations in the mill's wastewater effluent prompted Potlatch to form the Mercury Pollution Prevention Task Force to investigate feedstock chemicals for possible mercury contamination. The Potlatch Environmental Department, the Western Lake Superior Sanitary District (WLSSD), and the University of Minnesota, Duluth Department of Chemical Engineering collaborated on the project. Wastewater effluent and feedstock chemicals were monitored for mercury at strategic sample points to locate mercury sources in the pulp and paper manufacturing process. Typically, limited information on mercury content in feedstock chemicals is provided by suppliers. Buyers must specifically request that mercury content be included in a request for a certificate of analysis. To obtain information about mercury concentrations in feedstock chemicals, a questionnaire was developed and a phone survey of pulp mill chemical suppliers was conducted. Using wastewater monitoring data and a mass balance approach, sulfuric acid used in the bleach plant of the mill was isolated as the source of mercury. The origin of the mercury was determined to be sulfuric acid supplied by a secondary lead smelter. In January 1995, Potlatch stopped accepting sulfuric acid shipments from the secondary lead smelter and effluent mercury concentrations decreased by over 90%, to non-detectable levels at less than 0.05 ug/L, as measured by the WLSSD.

With systems in place to recycle mercury-containing devices, certificates of analysis and environmental, health and safety reviews of new chemical purchases, mercury pollution prevention work continued at the Potlatch facility through the turn of the century and beyond. In 1998, the mill completely eliminated the use of coal as a supplemental fuel in mill power boilers. In 1999 and 2000, the mill started up a new bleach kraft pulp mill and easily

demonstrated compliance with many new air and water point source mercury permit limits. In 2002, Potlatch sold the Cloquet pulp and paper mill to Sappi Limited. Under Sappi ownership, the mill has embarked on "Mercury Pollution Prevention Phase II." The focus of Phase II is to redo and expand the raw material investigation and continue the quest for comparatively priced raw materials with lower mercury concentrations. Another key element of Phase II is sharing the mill's experience by providing technical assistance and outreach to local industries, small businesses, recyclers, schools, and dentist offices.

Lamp Recycling: The Association of Lighting and Mercury Recyclers (ALMR), a non-profit organization representing lamp recyclers in the U.S., recently estimated that 150 million mercury-containing lamps were recycled in the U.S. in 2002—twice the amount recycled in 1997. Using the number of lamps sold five years ago (since lamps last an average of 5 years), ALMR and the National Electrical Manufacturers Association (NEMA) estimate that the overall lamp recycle rate in 2002 was 22.4%. Almost all lamp recycling is from non-residential users (business, commercial, institutional). The non-residential recycling rate was 27.6%. ALMR, the Solid Waste Association of America, and NEMA were awarded a grant by the US EPA to undertake a nationwide lamp recycling promotion program.

Thermostat Recycling: The Thermostat Recycling Corporation (TRC), a U.S. non-profit organization, recently announced that it had recovered nearly one ton of mercury from 221,000 used mercury switch thermostats between January 1998, when the program began, and June 2003. The TRC collected 358 pounds of mercury in the first half of 2003. If collections continued at the same rate throughout the rest of 2003, this would represent a 35% increase in the amount of mercury collected over 2002 and a 78% increase in mercury collected over 2001.

Indiana Mercury Thermostat Reduction and Recycling Pledge Program: The Mercury Thermostat Reduction and Recycling Pledge Program is the first of several initiatives to voluntarily reduce the amount of mercury-containing devices that may be found in Indiana homes. Since the beginning of the program in September 1997, nearly 200 heating, ventilation, and air-conditioning (HVAC) suppliers and contractors have signed up to participate in the voluntary program. Program participants are working with the Thermostat Recycling Corporation to utilize free recycling of discarded mercury-containing thermostats. For more information, visit IDEM's website at http://www.in.gov/idem/mercury/programs/hvac/index.html.

Indiana Mercury School Pledge and Lab Cleanup: On July 1, 2003, the Indiana Mercury and Mercury Products Law went into effect, restricting the sale of mercury-added novelties, thermometers, equipment, and mercury compounds for use in school laboratories, and the general sale of mercury-containing commodities. As a result, many schools joined the Indiana Mercury Reduction and Recycling for Schools pledge program in an effort to remove mercury from their schools. There are currently over 400 Indiana schools in the program. To view the pledge, visit the IDEM website at http://www.in.gov/idem/kids/mercury/schoolpledge.pdf. In addition to the school pledge program, IDEM, using EPA funds, provided assistance to 19 Indiana schools to clean up their science chemical closets.

Wisconsin Department of Natural Resources Mercury Reduction Program: Wisconsin's Department of Natural Resources (WDNR) mercury reduction program was started in 1998. Its goals are to:

1) reduce the public's use of mercury-containing products by promoting alternatives;
2) promote recycling of mercury products that continue to be used; and
3) reduce the potential for mercury spills.

The program focuses on sectors where mercury products have historically been used. These include healthcare facilities; dental facilities; schools; heating, ventilation and air conditioning contractors; dairy farms; auto scrap yards; and households. The WDNR partnered with 22 of Wisconsin's largest municipalities in implementing mercury education and recycling programs.

Table 1-1 reports the total mercury collected through WDNR's mercury reduction program. As of October 2003, the dairy manometer program had removed and/or replaced 525 mercury manometers, bringing the total amount of mercury collected to approximately 405 pounds. By the end of 2002, the auto switch sector had successfully removed 6,180 switches from automobiles before they were retired to a scrap yard. This equates to roughly 14 pounds of mercury. All of these programs are supported by U.S. federal and state grants, both to WDNR and mercury reduction communities.

Publicly Owned Treatment Works and Mercury Outreach in Indiana: In July 2003, IDEM received a Pollution Prevention Incentives for States (PPIS) grant from the US EPA Region 5 to provide workshops and on-site assistance and training to publicly owned treatment

Table 1-1. WDNR Mercury Reduction Program Collection Totals.

YEAR(S)	MERCURY COLLECTED (lbs)
1998-1999	5,100
2000-2001	6,600
2002	1,000
Reported to date for 2003	500
TOTAL	13,200

works (POTWs) through outreach to their local communities. The grant is an effort to reduce mercury in POTW influent and effluent. The Clean Manufacturing Technology Institute, local POTWs, other government representatives, and many more have agreed to participate in the stakeholder group. Further outreach could include training on incorporating pollution prevention into pretreatment permits.

Mercury Reduction at Publicly Owned Treatment Works in Ohio: During fiscal year 2003, the Delta Institute worked with two POTWs in the Lake Erie Basin of Ohio to catalyze community-wide mercury reduction efforts. The POTW pretreatment coordinators and the Delta Institute developed and applied tools needed to identify the mercury source sectors and initiate regulatory programs where applicable. Engaging both the regulated and non-regulated communities in stakeholder groups enabled both sewage treatment plants to pool the resources of many different agencies, organizations, and businesses throughout the community. Together, these groups pursued far-reaching mercury reduction initiatives, such as mercury thermometer collections, reaching many more people than sewage treatment plant staff could effectively reach independently.

Based on the experiences in these communities, a website entitled Mercury Pollution Prevention Road Map Steps was launched to serve as a resource for sewage treatment plants pursuing a mercury reduction program. The road map provides step-by-step guidance for sewage treatment plants and links to tools developed for this project and by others. The website can be found at http://www.delta-institute.org/pollprev/mercury/roadmap/roadmapintro.php.

Monitoring

The International Joint Commission's (IJC's) 10th Biennial Report on Great Lakes Water Quality recommended that mercury be added to the list of substances measured in the Integrated Atmospheric Deposition Network (IADN). Mercury had been cited since the inception of IADN as a key atmospheric constituent that should be monitored as soon as methods were available. In 2001, equipment was purchased and installed at the two IADN Canadian Master stations (Point Petre and Burnt Island) to measure gaseous and particulate mercury, as well as mercury in precipitation. The protocols employed were consistent with those of the Canadian (CAMNet) and U.S. (MDN) mercury deposition networks. These data will be used by the IADN Steering Committee to calculate updated mercury loading estimates for the Great Lakes.

Next Steps

The Mercury Workgroup will continue to focus on sharing information about cost-effective reduction opportunities, tracking progress toward meeting reduction goals, and publicizing voluntary achievements in mercury reduction. Particular attention will be paid to information-sharing in areas where mercury releases are significant but there are no existing federal regulations or where regulations are under development. For instance, the workgroup will attempt to focus on the contamination of metal scrap by mercury-containing devices, and the resulting emissions, and provide a forum for discussing cost-effective approaches to address this problem. In addition, the workgroup will focus on the issue of mercury releases from dental practices and will help state, provincial, and local governments identify cost-effective reduction approaches for this sector. The December 2003 workgroup meeting focused on discussing options to minimize mercury releases resulting from disposal of mercury-containing lamps.

Indiana Dunes National Lakeshore
Lake Michigan, Indiana
Photo by National Park Service
Indiana Dunes National Lakeshore

2.0 POLYCHLORINATED BIPHENYLS (PCBs)

Canadian Workgroup co-chair: ***Ken De***

U.S. Workgroup co-chair: ***Tony Martig***

Progress Toward Challenge Goals

U.S. Challenge: Seek by 2006, a 90% reduction nationally of high-level PCBs (>500 ppm) used in electrical equipment. Ensure that all PCBs retired from use are properly managed and disposed of to prevent accidental releases within or to the Great Lakes Basin.

Canadian Challenge: Seek by 2000, a 90% reduction of high-level PCBs (>1% PCB) that were once, or are currently, in service and accelerate destruction of stored high-level PCB wastes which have the potential to enter the Great Lakes Basin, consistent with the 1994 COA.

Canadian Progress

As of March 2003, approximately 85% of high-level PCB wastes had been destroyed, an increase of approximately 40% from 1998 when work in support of the GLBTS commenced. Over the past two years, approximately 1,300 tonnes of high-level PCBs have been destroyed (Figure 2-1), and as of April 2003, approximately 983 storage sites (both federal and private) were PCB-free (no PCBs in use or in storage), with about 555 sites still remaining (see Figure 2-2).

Outreach programs such as the PCB Phase-Out Awards, sector mail-out of PCB information, and voluntary commitment letters, continue to build industry awareness of PCB issues and destruction processes. Owners of large quantities of PCBs have been able to incorporate phase out/destruction activities into multi year operating plans, but smaller businesses have difficulty absorbing a large capital expense in any one fiscal year.

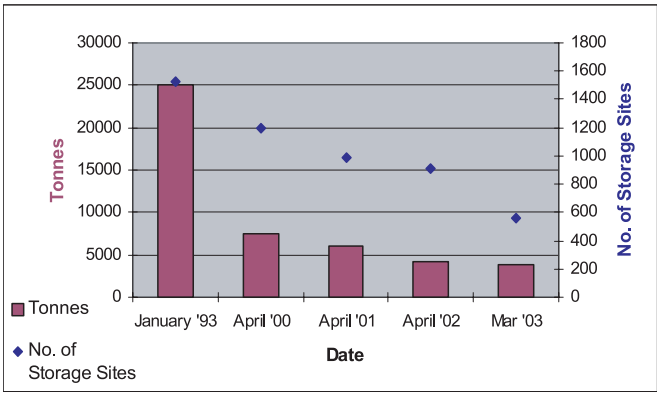


Figure 2-1. High-Level PCBs and Number of Storage Sites in Ontario. Source: MOE

United States Progress

According to annual reports submitted to US EPA by PCB disposers, about 87,000 PCB transformers and 143,000 PCB capacitors were disposed of between the 1994 baseline and the end of 2002. As a result, an estimated 113,000 PCB transformers and 1,330,000 PCB capacitors remained in use at the end of 2002. However, US EPA expects the amount of PCB equipment remaining in use to be much less. The difference between the charts and the actual amounts in use are in part due to data gaps which do not account for PCB transformers that have been reclassified to non-PCB, or PCB capacitors shipped to disposal companies in drums. One indication that the amount remaining in use is much less is that only 20,000 PCB transformers were registered with the US EPA in 2000, which represents an apparent 90% reduction from the 1994 baseline.

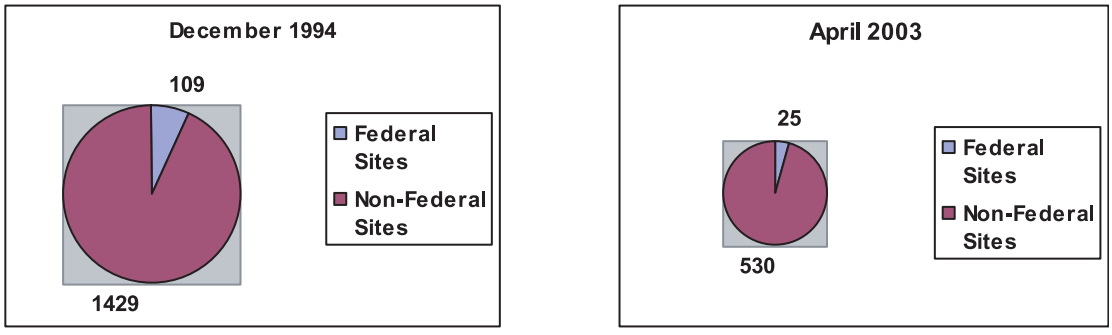


Figure 2-2. Number of Remaining Storage Sites with PCBs. Source: Environment Canada and Ontario Ministry of the Environment

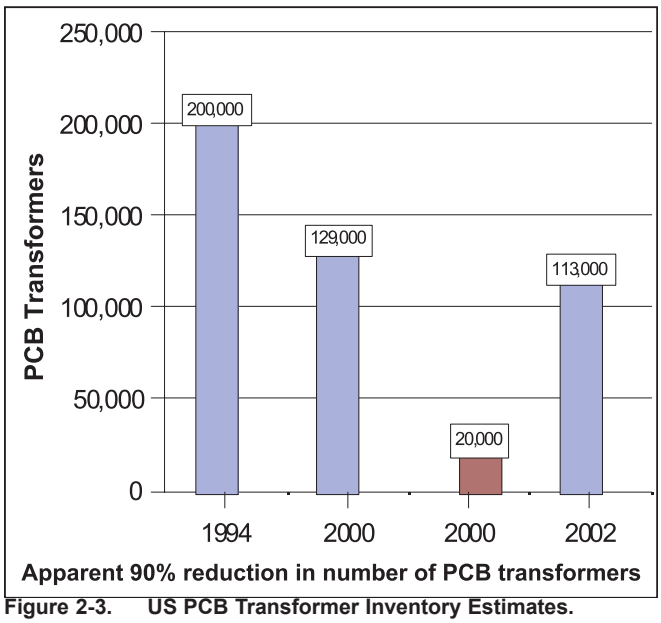


Figure 2-3. US PCB Transformer Inventory Estimates. Source: US EPA

Workgroup Activities and the 4 Step Process

In the past year, the PCB Workgroup has focused on Steps 3 and 4: identifying and implementing options for reduction. The workgroup continued to plan and implement outreach efforts, as well as seek voluntary reductions of PCB electrical equipment.

Reduction Activities

U.S. PCB Phase-Out Projects: The US EPA began to finalize a nationwide outreach campaign to phase-out PCB equipment, which will commence in 2004. Also in 2003, the US EPA funded an expansion of the outreach and PCB phase-out solicitation campaign, which will enable additional facilities to be contacted and also provide for additional follow-up with companies that have undertaken PCB phase-outs.

The US EPA Region 5 received comments from utility industry representatives on specific components of the PCB phase-out program, which should bolster participation. Region 5 also worked with Regions 9 and 10 to develop and implement a PCB phase-out program in those Regions. Both Regions 9 and 10 met with industry representatives in their Regions, primarily from the utility industry, and began to design a PCB phase-out program for facilities in their Regions.

U.S. PCB Phase Out at Federal Facilities: A draft letter to federal agencies and departments that own PCB equipment, to seek reductions in their PCB equipment, is under consideration by the US EPA. In support of this effort, a cost-benefit analysis of continued use versus removal and replacement of PCB equipment was funded by the Great Lakes National Program Office in 2003.

PCB Phase-Out Awards Program in Ontario: In 2003, the workgroup developed a Phase-Out Awards Program to recognize companies that have successfully phased-out their PCB equipment. The main elements of the program include:

- A photographed presentation of a plaque and small gift (set of coffee mugs or pens) to each eligible company that becomes PCB-free or reaches a major PCB target,
- A case study that will be posted on the PCB Workgroup website (hard copies will also be available for distribution at GLBTS and other meetings),
- A published list of award winners in GLBTS, IJC, government, and trade association publications, and
- Case study presentations at trade association meetings and conferences.

In September 2003, at the GLBTS Integration Workgroup meeting in Toronto, the first four Canadian award plaques were presented to Stelpipe (a division of Stelco Steel), Hydro One, Slater Steel, and Enersource Hydro Mississauga. Figure 2-4 presents photos of company representatives receiving their awards from Gary Gulezian (US EPA) and Danny Epstein (Environment Canada) at the September 11, 2003, Integration Workgroup meeting. Table 2-1 describes the PCB phase-out history of these four companies.

A number of other PCB owners have expressed interest in the awards program, and applications are in progress. The next award presentation ceremony will likely be at the next Integration Workgroup meeting in Toronto. It is hoped that awards will be given at each Stakeholder Forum held in Canada from this time forward.

Canadian Case Studies: Environment Canada is developing case studies for each company that receives a PCB Phase-Out Award. Case studies for Stelpipe, Hydro One, Slater Steel, and Enersource Hydro Mississauga have been drafted and will be printed in hardcopy and posted on the GLBTS PCB website when completed. The goal of the case studies is to promote PCB removal among companies by providing success stories of companies who decided to remove PCBs.

Canadian GLBTS PCB Newsletter: Environment Canada has developed a GLBTS PCB newsletter that will be used to summarize information about the GLBTS, PCBs as an environmental hazard, the Phase-Out Awards Program, and other issues. The main target audience is the PCB-owning industry, in particular industrial environmental managers who need capsule-style information because of the overwhelming demands on their time. The first edition of the newsletter has been published and is available from Ken De, Environment Canada (416-739-5870; ken.de@ec.gc.ca).

Figure 2-4. **Representatives of Hydro One (top left), Stelpipe (bottom left), Slater Steel (top right), and Enersource Hydro (bottom right) were the first Canadian companies to receive a PCB award. Source: Environment Canada**

Table 2-1. PCB Phase-Out History of Companies Recognized by PCB Awards Program.

Company	Initial High-Level PCB Inventory	Phase-Out History	% Elimination of High-Level PCBs
Hydro One	In 1983, 40 large askarel transformers and 30,000 PCB capacitors (lg)	All removed and destroyed by 1999	100%
Enersource Hydro Mississauga	19,500 kg askarel oil in transformers 14,000 kg askarel transformer solids 67,000 kg PCB capacitors and ballasts (high-level)	Removed from service by 1990 Sent for destruction in 2000	100%
Stelpipe (a division of Stelco)	5 large askarel transformers 65 lighting and control (small) transformers	All removed and destroyed by 1998	100%
Slater Steel	Empty transformers, askarel liquid (transformer oil), PCB contaminated mineral oil, capacitors, debris, metal debris	Sent to Gary Steacy Dismantling in 1998	100%

Minnesota Pollution Control Agency (MPCA) Small Quantity PCB Owner Disposal Cooperative: The MPCA continues to work with municipalities, rural electric cooperatives, and other small owners of PCB equipment, to accelerate disposal. In 2002/2003, MPCA visited all transformers in several utility power systems that were previously identified as PCB suspects and measured their distance to a water body. Almost 7,000 transformers were assessed through computer queries to separate non-PCB transformers from those that might contain PCBs. The queries compared serial numbers from the transformer inventories of three clients to manufacturers' lists of serial numbers that might contain PCBs. Of the transformers that the MPCA has evaluated so far, 296 tripped the queries as being highly or moderately likely to contain over 50 ppm PCBs or, for those cases when no manufacturer information was available, were classified as "test first."

Source Profiles and Emissions Quantitation of PCBs to Ambient Air from Transformers: The US EPA Great Lakes National Program Office funded a project to study emissions of PCBs from in-service PCB transformers. The study is titled Source Profiles and Emissions Quantitation of PCB to Ambient Air from Transformers. Under this project, air monitoring will be conducted for PCBs in samples collected at or near in-service PCB askarel transformers. The study is being conducted by Dr. William J. Mills, of the University of Illinois. The study is a follow-up to the study on emissions from the Smithville CWML site in Ontario, also conducted by Dr. Mills, which was presented at the PCB Workgroup meeting of May 12, 2001 (minutes of the meeting are available at http://www.epa.gov/glnpo/bns/pcb).

Accelerating Phase-Out of PCB Transformers: The Business Case: The US EPA Great Lakes National Program Office funded a project to study the costs associated with the continued use and disposal of PCB transformers. Under this project, the Tellus Institute will develop case studies for up to two industry firms to understand the firms' current cost assessments for PCB transformer use and develop updated cost estimates of PCB transformer management and disposal. The study is a follow-up to a study commissioned by General Motors Corporation that was presented and discussed at the PCB Workgroup meeting of November 14, 2001 (minutes of the meeting are available at www.epa.gov/glnpo/bns/pcb).

Regulatory Activities

Canadian Regulatory Activities

Four Environment Canada PCB regulations are being amended and targeted for Canada Gazette publication in 2003 and 2004. These regulations are:

1) The Chlorobiphenyl Regulations (1977);

2) The Storage of PCB Materials Regulations (1992);

3) PCB Waste Export Regulations (1996); and

4) Federal Mobile PCB Treatment and Destruction Regulations.

Environment Canada is currently drafting revisions to the Chlorobiphenyl Regulations and Storage of PCB Materials Regulations under the Canadian Environmental Protection Act. The most significant revisions to the regulations will be the imposition of strict phase-out dates for certain categories of PCBs. Revisions to the Federal Mobile PCB Treatment and Destruction Regulations will strengthen emissions release provisions, mainly to bring the federal regulations in line with existing provincial requirements.

Extensive public consultation was conducted, and the revised regulations should be published in the Canada Gazette in early 2004. More information and updates can be found on the Environment Canada website (http://www.ec.gc.ca/pcb/).

U.S. Regulation Update

In the Federal Register of July 30, 2003, a final rule was published and became effective on September 9, 2003. The rule clarifies how PCB-contaminated used oil is regulated. It states the following:

- Used oil containing PCBs at concentrations of 50 ppm or greater is subject to Federal PCB regulations,
- Dilution may not be employed to avoid this regulation, unless otherwise specifically provided for by the RCRA or Federal PCB regulations,
- Used oil containing PCBs at concentrations less than 50 ppm is subject to the RCRA used oil management standards, unless it has been diluted (from 50 ppm or greater), in which case it is treated as having 50 ppm or greater PCBs.

Related Activities

Federal PCB Databases in Canada: Federal PCB databases can now be accessed and read from Environment Canada's Green Lane website (http://www.ec.gc.ca/PCBDatabase/). The site has several features including:

- Basic and advanced search capabilities for finding company and PCB inventory information from the PCB databases;
- Detailed search criteria to find specific information on companies and their PCB inventories;
- A report generator that allows users to format the results of a search and save their reports in either a grid format, Microsoft Excel format, or a printer friendly version format.

Access to the databases is read-only and limited to those who have an approved login account.

Industry Sector PCB Success Stories

Canada

The following achievements highlight recent industry successes in Canada:

Pulp and Paper

- The pulp and paper sector has largely replaced its PCB-containing equipment. However, because of the high cost of destruction, and the unfavorable economic conditions for this sector during the past several years, mills have been forced to continue storing PCB materials.

Utilities

- Enersource Hydro Mississauga eliminated all high-level PCBs;
- Canadian Niagara Power eliminated all high-level PCBs from its Niagara-area network.

Steel Sector

- Canadian steel producers continue to phase out the use of equipment containing PCBs and disposing of stored PCB waste. Between 1990 and 2002, in-service equipment containing PCBs has decreased by 53%, high-level PCB wastes have been reduced by 98%, low-level PCB wastes by 91%, and 12 of 23 facilities reported no PCB equipment in use or PCBs in storage.

Others

- Public Works and Government Services Canada implemented an aggressive PCB phase-out program, eliminating over 90% of their PCBs in Ontario.

United States

Below are summaries of several industry PCB phase-out activities in the United States that were reported to US EPA.

USWAG PCB Reduction Efforts

Since its last update in 2002, electric and gas utility member companies of the Utility Solid Waste Activities Group (USWAG) have continued with a wide range of voluntary PCB reduction efforts, both within the Great Lakes Basin and in other regions of the country. At the last USWAG PCB Committee meeting in December 2003, attendees reaffirmed that most USWAG companies have procedures in place to ensure that virtually all equipment containing PCB in concentrations greater than 50 ppm have been identified during repair/servicing have been disposed of and not returned to service. These reduction efforts, combined with voluntary retrofill/reclassification programs, are resulting in the continued reduction of PCB-containing equipment from utility inventories across the country. This continuing progress underscores the determined efforts of USWAG members to systematically remove PCB-containing equipment from their operating systems.

In addition to the systematic retirement of PCB-containing equipment identified during repair/servicing, USWAG member companies also undertake, where practical, dedicated efforts to identify and remove PCB-containing equipment from service. For example, **Northern Indiana Public Service Company** (NIPSCO) has a voluntary program in place designed to achieve a virtual phase-out of PCBs from its electrical system by 2005. This effort, initiated in 1994, continues and, from January 1, 2001, through September 1, 2003, NIPSCO removed or retrofilled 522 pieces of equipment known or suspected to contain PCBs. Since the beginning of the PCB regulatory program, NIPSCO has removed well over 97% of the PCBs in its electrical system.

American Electric Power (AEP) continued similar reduction efforts. Within the Great Lakes Basin, AEP has no known PCB transformers or capacitors. In addition to its excellent reduction efforts in 2002, in 2003 AEP removed from service 1,830 pieces of PCB-containing electric equipment from EPA Regions 3 through 5, including 1,658 pieces of PCB-contaminated equipment (between 50 ppm and 499 ppm PCBs), 155 pieces of equipment containing greater than 500 ppm PCBs, and 17 PCB capacitors. Since 2000, in these three EPA Regions, AEP has removed from service 7,157 pieces of PCB-contaminated equipment, 616 pieces of PCB equipment (containing greater than 500 ppm PCBs), and 3,219 PCB capacitors, for a total of 10,992 pieces of PCB-containing electric equipment removed from service. In its EPA Region 6 territory, AEP removed 244 PCB items containing greater than 500 ppm PCBs, 419 PCB-contaminated items (50-499 ppm PCBs), and 953 PCB capacitors.

Also in the Great Lakes Basin, **Detroit Edison** is in the final year of a 10-year voluntary phase-out program to eliminate all PCB capacitors in transmission substations. Under this initiative, over 19,000 PCB capacitors have been voluntarily removed from service and replaced with PCB-free units, with all remaining PCB capacitors scheduled for removal from service by the end of 2004. In addition, in 2003, 27 PCB transformers and 600 PCB-contaminated transformers identified by Detroit Edison during equipment servicing were removed from service and replaced with non-PCB equipment. Detroit Edison supplements its PCB-reduction efforts through retrofilling and reclassifying large PCB and PCB-contaminated transformers in company substations and power stations. In 2003, the company removed approximately 54,000 kgs of PCB fluids from service through these reclassification efforts.

Another smaller, Midwestern USWAG member recently retired from service 12 PCB pieces of equipment (containing greater than 500 ppm PCBs) and 90 PCB-

contaminated pieces of equipment (primarily transformers).

These PCB reduction efforts are not limited to USWAG members in the Great Lakes Basin. For example, **Consolidated Edison of New York** (Con Ed) has sampled all distribution, network, and substation transformers manufactured before 1979 and has removed from service or retrofilled all such units identified as containing > 50 ppm PCBs. The company also has replaced all known askarel transformers and PCB capacitors with non-PCB units. In 2003, Con Ed removed from service more than 19,000 lbs of PCBs from equipment containing greater than 500 ppm PCBs, in addition to the removal from service of 20 PCB-contaminated transformers and 7 PCB-contaminated bushings weighing 91,000 lbs, for a total PCB reduction in 2003 of 110,000 lbs (50,000 kgs).

In addition, in 2002, **National Grid USA**, New England Division, systematically retired or decommissioned 806 pieces of PCB-containing electrical equipment, resulting in the disposal of 90,335 kgs of PCB-containing electrical equipment from its service territory in Massachusetts, Rhode Island, and New Hampshire (including transformers, bushings, capacitors, and miscellaneous PCB-containing equipment).

Also in New England, **Central Maine Power Company** (CMP) is voluntarily undertaking a multi-year effort to remove transformers from its distribution system that are suspected to be PCB-contaminated. Since 1999 when the program began, CMP has removed over 7,000 transformers that it believes have a high probability of PCB contamination. Of this number, approximately half were actually PCB-contaminated. As part of this ongoing voluntary reduction effort, in 2003, CMP voluntarily removed 1,500 transformers from its system and has, over the life of this voluntary program, removed one-third of the transformers in its distribution system that it believes are most likely to be PCB-contaminated.

Meanwhile, on the West Coast, USWAG member **Pacific Gas and Electric** (PG&E) has had a dedicated PCB reduction program in place for many years and, as a result, has removed from service more than 99% of the PCBs that previously existed in PG&E's electric distribution system (including PCBs contained in capacitors and network transformers). Since 2000, PG&E has engaged in the systematic removal of a series of capacitor banks at several major (500 kV) substations, resulting in the removal of several hundred thousand pounds of high-concentration PCB capacitors.

In addition, **TXU** in Texas has, since the early 1990s, aggressively pursued removal of PCBs from its operating system. Since 1993, TXU has retired 3,108 pieces of PCB equipment (containing > 500 ppm PCBs). With the exception of a small quantity of specialized equipment, TXU has a policy of retiring all distribution equipment identified for repair or service, with PCB concentrations greater than 1 ppm. During 2003, TXU retired from its service area 189 pieces of PCB electrical equipment (> 500 ppm PCBs), 672 pieces of PCB-contaminated electrical equipment (50-499 ppm PCBs), and 3,477 pieces of electrical equipment containing from 1 ppm to 49 ppm PCBs.

Finally, like investor-owned electric utilities, a large number of smaller electric utility cooperatives also are actively engaged in voluntary PCB reduction programs. A recent survey conducted by USWAG member, the **National Rural Electric Cooperative Association** (NRECA), confirms that the vast majority of electric cooperatives have programs in place to identify and remove from service PCB-containing electrical equipment (> 50 ppm), and a number of respondents reported significant progress toward obtaining PCB-free systems. For example, in 2002, 46 electric cooperatives reported removing from service a combined total of 715 pieces of PCB-containing electrical equipment. In 2003, these same cooperatives further removed a combined total of 1,438 pieces of PCB-containing equipment from service.

DaimlerChrysler

To date, DaimlerChrysler has removed 99% of all of its PCB capacitors. Removal of all high-level PCBs from transformers in DaimlerChrysler U.S. facilities was completed by 1999.

Minnesota Power

Minnesota Power (MP) has removed all of its high-level PCBs except for two PCB capacitor banks, removing over 2,500 PCB capacitors since 1994. The two remaining PCB capacitor banks are to be removed during the third quarter of 2004. MP had already removed all of its known PCB transformers and sources of PCB oil of 500 ppm. MP also continues to remove its PCB-contaminated oil in electrical equipment.

Next Steps

The workgroup plans to continue its core activities, including the following:

PCB Reduction Commitments

The workgroup will continue seeking commitments to reduce PCBs through PCB reduction commitment letters and other PCB phase-out efforts.

Outreach/Sharing Information

The workgroup will continue to develop, distribute, and post on the workgroup website (see http://www.epa.gov/glnpo/bns/pcb), information which can facilitate and promote the identification and removal of PCB equipment. These include photographs of electrical equipment, fact sheets, case studies, and a standard presentation of the PCB Workgroup's challenges

and activities. The workgroup will also continue to consider incentives for removing PCB equipment.

ISO 14000 and PCBs

At the December 2002 PCB Workgroup meeting, the PCB Workgroup decided to approach the ISO (International Standards Organization) to include PCBs as a specific substance to be managed and eliminated as part of their ISO 14001 program. If the ISO were to include PCBs as a targeted substance, it would encourage applicants for ISO status to plan for the elimination of their PCBs. An ISO representative will attend the June 2004 workgroup meeting in Toronto to follow up.

Property and Liability Insurance and PCBs

After questions and discussion at the May 2003 PCB Workgroup meeting, the PCB Workgroup decided to re-investigate if and/or how insurance companies handle PCBs as an insurance risk. If PCBs are seen by insurance companies as a risk, then it could be an advantage to PCB owners to eliminate their PCBs and reduce their risk ratings.

Tall Ship Malabar
Traverse City, Michigan
Photo by Terry W. Phipps, courtesy of the Michigan Travel Bureau

3.0 DIOXINS/FURANS

Canadian Workgroup co-chair: ***Anita Wong***

U.S. Workgroup co-chair: ***Erin White Newman***

Progress Toward Challenge Goals

U.S. Challenge: Seek by 2006, a 75% reduction in total releases of dioxins and furans (2,3,7,8-TCDD toxicity equivalents) from sources resulting from human activity. This challenge will apply to the aggregate of releases to the air nationwide and of releases to the water within the Great Lakes Basin.

Canadian Challenge: Seek by 2000, a 90% reduction in releases of dioxins and furans from sources resulting from human activity in the Great Lakes Basin, consistent with the 1994 Canada-Ontario Agreement.

Both countries have made significant progress toward reaching the dioxin/furan reduction goals outlined in the Strategy. Based upon the 1987 baseline inventory, known U.S. dioxin emissions were reduced 77% by 1995 and are projected to be reduced 92% by the end of 2004. These reductions are primarily the result of implementing the Maximum Achievable Control Technology (MACT) program under the Clean Air Act. Reductions in the largest inventory categories are shown in Figure 3-1. Once the MACT program has been fully implemented, the largest dioxin source in the U.S. will be household garbage burning.

The U.S. is also investigating numerous dioxin sources that have not yet been added to the inventory. While the U.S. challenge goal for dioxin was met under the Strategy, according to the current inventory, the US EPA is concerned about sources that are not yet quantified. Many of these sources are difficult to inventory, such as forest fires and other uncontrolled combustion sources. The US EPA is currently finalizing the 2000 Dioxin Inventory, the most comprehensive dioxin inventory to date. This inventory will be used by the workgroup to investigate sources directly within the Great Lakes Basin.

Canada has made significant progress toward meeting the goal of a 90% reduction in releases of dioxins and furans, achieving a 79% reduction, relative to the 1988 Canadian baseline. Much of the reductions achieved are attributable to the pulp and paper sector after federal regulations were imposed. Figure 3-2 illustrates reductions in the top Canadian (Ontario) dioxin/furan emission sources from 1990, 1997, and 1999 (based on "Inventory of Releases - Updated Edition", February 2001, Environment Canada). This figure also includes a forecast for 2005. The renewed Canada-Ontario Agreement with Respect to the Great Lakes Basin Ecosystem commits to a 90% reduction in the release of dioxin/furans by the year 2005, from a baseline of 1988. Based on current initiatives underway or proposed for dioxins/furans, such as Canada-wide Standards for waste incineration, iron sinter and electric arc furnaces, and Ontario's proposal to phase out hospital incinerators, it is expected that Canada will meet this commitment by 2005 within the Great Lakes Basin.

Workgroup Activities and the 4-Step Process

In the past year, the workgroup has made the following progress in the 4-step process:

- The workgroup met on May 14, 2003 at the Binational Toxics Strategy Stakeholder Forum in Windsor, Ontario.
- The workgroup developed a new workplan outlining its goals for the next two years.
- The workgroup held conference calls on July 31 and November 4 to discuss the new workplan and receive comments from members.
- The Burn Barrel subgroup was formed in Spring 2000 to address the emerging issue of household garbage burning. Through conference calls, surveys, and research, the subgroup developed a strategy in May 2001 to seek reductions in household garbage burning. The strategy is currently being implemented by both national governments along with partners in states, provinces, Tribes, First Nations, municipalities, industries, and environmental and health organizations.

Reduction Activities

Burn Barrels and Household Garbage Burning: Burn barrels and other household garbage burning methods remain a high reduction priority for the workgroup. Household garbage burning is estimated to emerge as the largest source of dioxin emissions after air emissions standards for industrial sources are in place. The practice of household garbage burning is typically carried out in old barrels, open pits, woodstoves, or outdoor boilers. The Burn Barrel Subgroup, led by Bruce Gillies of Environment Canada, is addressing this issue. Through surveys and research, the subgroup developed the Household Garbage Burning Strategy in May 2001 for seeking reductions in household garbage burning. The subgroup maintains a website at http://www.openburning.org.

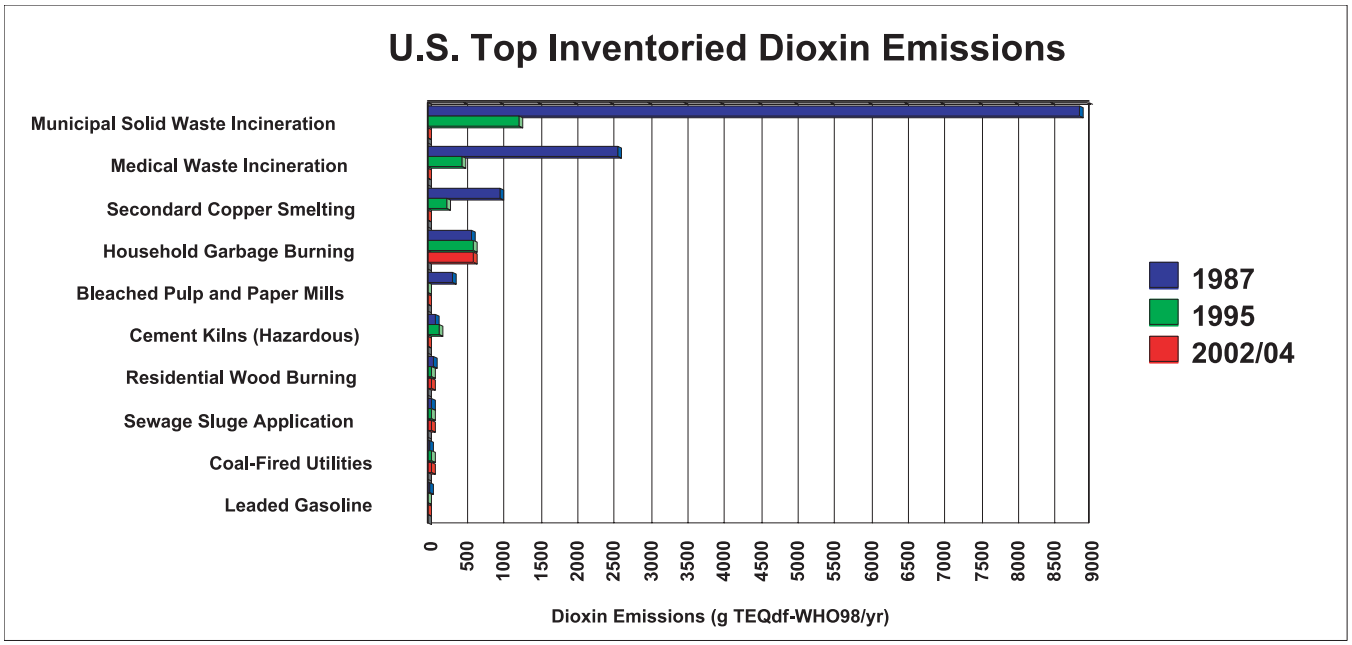


Figure 3-1. U.S. Top Inventoried Dioxin Emissions – Inventory of Sources of Dioxin in the U.S., May 2002. Source: US EPA

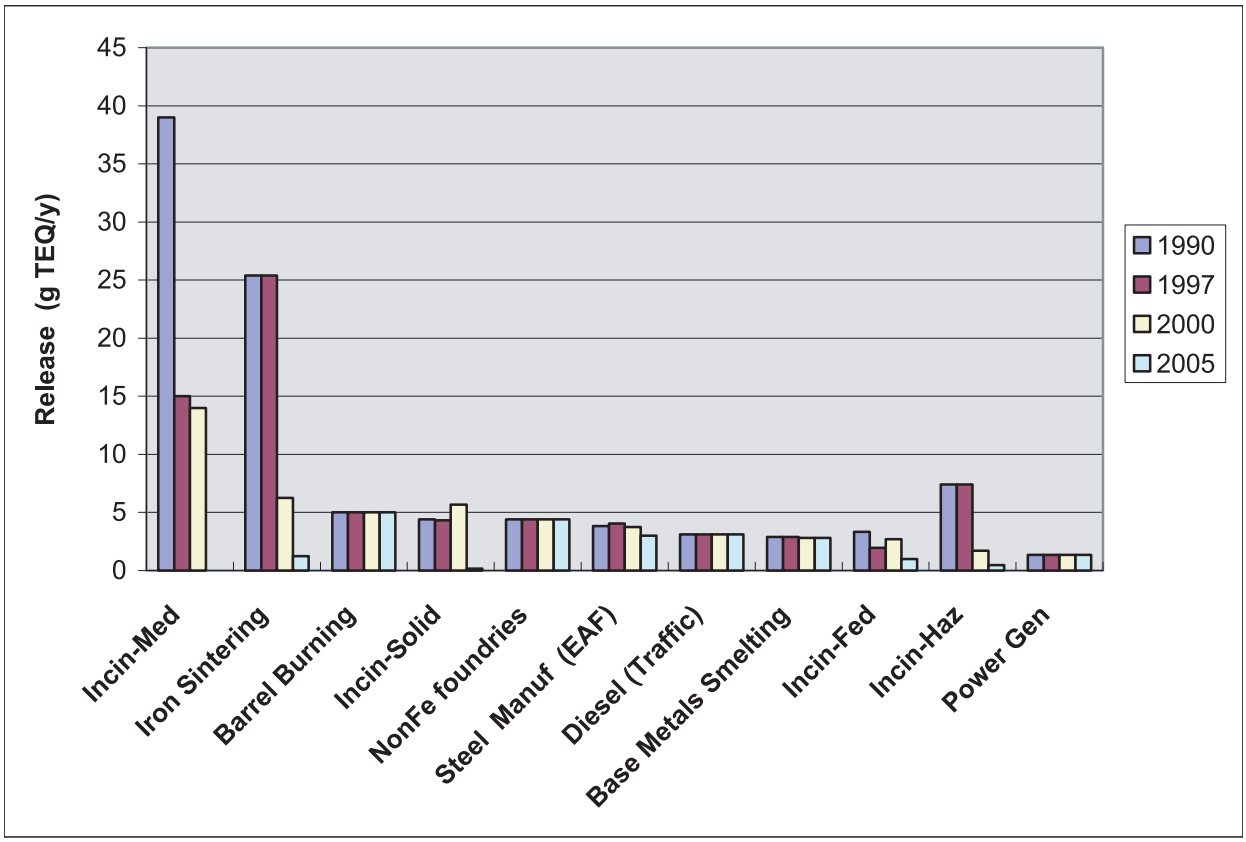


Figure 3-2. Top Canadian (Ontario Region) Dioxin/Furan Emission Sources "Inventory of Releases - Updated Edition," February 2001. Source: Environment Canada

The U.S. and Canada are looking to the Household Garbage Burning Strategy in the Great Lakes Basin as a model for other parts of the two countries. The subgroup members assisted the US EPA in developing four brochures for outreach to States, Tribes, and residents on the hazards of burn barrels. The brochures are available online at www.epa.gov/msw/backyard. In addition, the US EPA Region 5 worked closely with States in that region to develop outreach messages for burn barrels. Region 5 plans to develop a formal presentation on backyard burning issues to use at public meetings in the next year. Environment Canada-Ontario Region continued its partnership with EcoSuperior Environmental Programs for education and outreach on this issue in the Lake Superior region.

Wood Preservation: The Dioxin Workgroup has been working to address treated wood life-cycle management practices for utility poles. When poles have reached their end life for utilities, they are typically resold into a secondary market or disposed as solid waste. The workgroup is focusing on an outreach effort to educate consumers on appropriate use and care for treated wood.

Both Canada and the U.S. have gathered information on the management of out-of-service treated wood. In the U.S., the Utility Solid Waste Management Group (USWAG) has led this activity. USWAG developed Guidelines for the Management of Treated Wood and is working with the US EPA to formalize those guidelines through a memorandum of understanding. In Canada, the wood preservatives issue is being managed nationally under the EC-led Strategic Options Process. At this point, both countries are exploring opportunities to improve public awareness of safe and environmentally responsible handling of used treated wood as a pilot project in the Great Lakes Basin.

Incinerator Ash Disposal: Incinerator ash disposal has been an ongoing topic of discussion within the Dioxin Workgroup. Uncertainties exist with regard to the significance of dioxins/furans in landfill leachates that are generated by disposed incinerator ash and how well these leachates are contained at existing landfills. This issue has become more prominent as improved air pollution controls in waste incineration transfer toxic substances from air to ash. In 2003, the Canadian and U.S. co-chairs prepared a discussion paper on the current management system for incinerator ash. The ash is not routinely tested for dioxins/furans in both jurisdictions, and further information needed to be gathered. Available information showed that measured dioxin/furan levels were low, at concentrations less than 1 ppb, but measurements were taken using outdated techniques. In addition, the available literature does not provide evidence that disposal of municipal waste incinerator ash leads to dioxin leaching.

In 2003, Canada conducted a study in an attempt to answer questions related to ash management. Information was compiled on the management and disposal practices of residues generated from waste incinerators and coal-fired power plants in Ontario. Most residues are sent to a municipal landfill. Flyash that is designated as hazardous is sent to a hazardous waste landfill. Based on analytical data collected by EC in the late 1980's, the most significant source of dioxin/furan loading was from the Hamilton-Wentworth Solid Waste Reduction Unit (SWARU) facility in Hamilton, Ontario (over 200 grams (ITEQ) per year). Residues from this facility were disposed of at the local landfill site in Hamilton. Dioxin/furan levels in residues were below the detection limit for sewage sludge incinerators, and measurements were not available for hazardous waste and biomedical waste incinerators. For coal-fired power plants, the dioxin/furan loading in the coal ash was estimated to be 0.04 grams per year.

The Canadian study also concluded that non-polar organic compounds, including polychlorinated dibenzo-p-dioxins and polychlorinated dibenzo-p-furans (PCDD/PCDFs), are not readily soluble in water and remain strongly sorbed to particulate matter. The only potential migration pathway identified for these compounds is through sub-surface transport of colloidal particles, in which case the residues would have to be deposited with other materials containing a high organic content, such as compost or municipal solid waste. Finally, the study concluded that a well-engineered sanitary landfill should provide adequate control measures for the capture and treatment of any leachate generated.

Landfill Fires: Due to existing regulations that ban burning of garbage at landfill sites in Ontario, fires at municipal landfills are infrequent. It is suspected that landfill fires exist on First Nations lands, but more information needs to be collected on their waste management practices. Canada is conducting a study to gather information on open burning practices on First Nations lands in Ontario. In addition, a national study to gather information on trench burning, under the dioxin/furan Canada wide Standard process, was conducted in 2003. This study used information presented in the workgroup's discussion paper. It concluded that there are an estimated 1,600 landfill sites in Ontario with 58% located in the Northern Region. Of these 58% (928 sites), 1.0 to 3.0% of the Northern region landfill sites are burning waste in Ontario. The study estimated a dioxin/furan loading of 0.5 to 1.5 grams (ITEQ) per year from waste burning at landfills, based on a US EPA emission factor.

Based on information gathered from the majority of Great Lakes States (Illinois, Indiana, Michigan, Minnesota, New York, Pennsylvania, and Wisconsin), it is unlikely that landfill fires in the Great Lakes States are frequent. Information gathered from the Ohio Fire Marshall's office,

however, indicates that landfill fires are common. The US EPA is currently gathering more information regarding this issue.

Inventory Improvements: The US EPA maintains and annually updates the Toxics Release Inventory (TRI), a publicly available database that contains information on toxic chemical releases and other waste management activities. Due to the high toxicity of dioxins and furans to humans, the US EPA added these to the list of chemicals that facilities are required to report for the 2000 TRI inventory. According to TRI, 148,759 grams of total releases of dioxin and dioxin-like compounds were reported for 2001 in the U.S. More information is available on the website at http://www.epa.gov/tri.

In addition to TRI, the eight Great Lakes States and the Province of Ontario maintain a regional emissions inventory for hazardous air pollutants, including dioxins and furans. The US EPA also continues to update the National Dioxin Emissions Inventory, which indicates that over 90% of all dioxin releases in the U.S. are from air sources. The US EPA is separately tracking emission reductions from the MACT program requirements for municipal waste combustors (MWCs) and medical waste incinerators. MWC data for dioxin/furan compounds show a 99% reduction in emissions from 1990 to 2000.

PCDD and PCDF as a group have been included in the list of substances for reporting under Environment Canada's National Pollutant Release Inventory (NPRI), beginning with the reporting year 2000. The reported information is made available to the public on an annual basis through the Environment Canada website at http://www.ec.gc.ca/pdb/npri. Environment Canada will use the NPRI data to update the point source information in the Canadian National Dioxin/Furan Release Inventory, which is currently being updated to years 2000 and 2001.

Since the initiation of the Canadian Voluntary Stack Testing Program in the spring of 2000, EC has conducted stack tests for dioxins and furans and many other substances of concern at eight volunteer facilities in Ontario. Between 2000 and 2002, a nickel base metal smelter, two medical waste incinerators, a steel foundry, a Kraft boiler, and a crematorium were tested. In 2003, an additional Kraft boiler located in Marathon and two animal carcass incinerators (Ecowaste and Burneasy) were tested. Results for the sources tested in 2003 will be available in mid-2004, and the test results will continue to be presented at GLBTS stakeholder meetings. The information gathered through this program will help improve release inventories for dioxins/furans as well as other Strategy substances.

Ambient Air Monitoring: The US EPA conducts air monitoring for dioxin under the National Dioxin Air Monitoring Network (NDAMN), in order to track fluctuations in atmospheric deposition levels. NDAMN was initiated in year 2000. Results for years 2000 and 2001 will be available by the end of 2003.

Ambient air monitoring of GLBTS substances has been conducted in Canada since 1996 through the National Air Pollution Surveillance Network (NAPS). Dioxins and furans have been monitored at seven stations, comprised of four urban and three rural sites. Results show elevated levels at urban sites compared to rural sites but a decreasing trend in concentrations overall. All concentrations remain below the Ontario Ministry of Environment ambient air quality criteria of 5 picograms per cubic metre (TEQ), 24 hour average. In 2002, the highest mean concentration in Ontario was 77 femtograms per cubic metre (TEQ), measured in Hamilton near the SWARU municipal waste incinerator. This incinerator was shutdown in December 2002. In August 2003, PCDD/PCDF sampling began at an IADN site located at Burnt Island.

Joint Priorities with Other GLBTS Workgroups: Over the past year, the Dioxin/Furan Workgroup has continued to coordinate efforts with the HCB/B(a)P Workgroup on issues of mutual concern. Previously identified joint sources include wood burning stoves and treated wood. The workgroups will continue to review new sources, which may warrant further collaboration in 2004.

The Dioxin/Furan Workgroup is gathering information on coplanar PCBs, which are dioxin-like compounds, and will be exploring potential joint activities with the PCB Workgroup in 2004.

Next Steps

In the past three years, the workgroup has focused its efforts on dioxin/furan releases from priority sectors identified through a decision tree process undertaken in 1999-2000. At this point, many of the priority sectors have been addressed through a combination of regulations, national and regional programs, and outreach efforts. However, data gaps remain for a number of other sources. A draft workplan was prepared in 2003 to guide the workgroup in addressing new sources and other issues over the next two years. Workplan elements include: continued reporting of national/regional programs, characterizing new sources of concern, outreach efforts to address new sources, continuing implementation of the Burn Barrel Strategy by the Burn Barrel subgroup, exploring pathway intervention, pursuing potential joint work with the B(a)P/HCB and PCB Workgroups, and tracking environmental monitoring information.

4.0 HEXACHLOROBENZENE/ BENZO(a)PYRENE (HCB/B(a)P)

Canadian Workgroup co-chair: ***Tom Tseng***

U.S. Workgroup co-chair: ***Steve Rosenthal***

Progress Toward Challenge Goals

U.S. Challenge: Seek by 2006, reductions in releases, that are within, or have the potential to enter the Great Lakes Basin, of HCB and B(a)P from sources resulting from human activity.

Canadian Challenge: Seek by 2000, a 90% reduction in releases of HCB and B(a)P from sources resulting from human activity in the Great Lakes Basin, consistent with the 1994 Canada-Ontario Agreement.

The U.S. has taken steps toward the goal of seeking reductions of HCB and B(a)P releases to the Great Lakes Basin. Figure 4-1 illustrates the trends in HCB air and water releases reported to the TRI from 1990 to 2001. Figure 4-2 illustrates approximate HCB emission reductions achieved in the U.S. from 1990 to 1997, by source category, both with and without the assumption that all of the HCB contaminant in pesticides is released subsequent to the pesticide application. While the US EPA uses a volatilization rate of approximately 8% in inventory calculations, recent studies suggest that 100% of the HCB contaminant volatilizes. [4, 5] Figure 4-3 presents estimated B(a)P emissions in the Great Lakes Basin for 1996 through 1999, by source category, as reported by the Great Lakes Regional Air Toxic Emissions Inventory project. This inventory reflects emissions from eight Great Lakes States and the Province of Ontario.

From a 1988 baseline, the latest Canadian inventory estimates show a HCB release reduction of 62% (Figure 4-4[6]) and a B(a)P reduction of 45% (Figure 4-5[7]). B(a)P progress is primarily the result of changes and improvements in the iron & steel coke making and the residential wood combustion sectors, while HCB progress is attributed mainly to lower trace contamination levels in agricultural pest control products and reductions within the waste incineration sector.

Workgroup Activities and the 4 Step Process

Emission Inventories: Additional efforts have been made to resolve uncertainty regarding HCB emission levels from utility coal combustion and rubber tire manufacturing. A review of test data indicates that utility coal combustion does not appear to be a significant source of HCB, and the Rubber Manufacturers Association has performed testing which has shown that rubber tire manufacturing is not a source of HCB.

In the U.S., a MACT standard for primary aluminum plants has reduced emissions of B(a)P and other air toxics released during the production of molten aluminum metal. As a result of this MACT standard, B(a)P emissions from the single primary aluminum plant located in the Great Lakes, the Alcoa plant in Indiana, have been reduced to approximately 150-250 pounds per year. Also, the petroleum refining sector expressed concern that the B(a)P release estimates for fluid catalytic cracking units had been grossly overestimated. A subsequent review of test results confirmed that these units are no longer major B(a)P sources in the basin.

U.S. Steps 1&2 B(a)P and HCB reports on sources and regulations and a Step 3 report on reduction options have been completed and posted on the Binational Toxics Strategy website. In addition, a draft addendum to the HCB Step 1&2 report has been prepared to incorporate the 1996 National Toxics Inventory (NTI) results. The US EPA's 1996 NTI was released around September 2000. This is especially significant because it was prepared using a "bottom-up" approach in which the States determined emission levels from sources located within their boundaries using a common set of emission factors that

[4] Benazon Environmental Inc., "Hexachlorobenzene Sources, Regulations and Programs for the Ontario Great Lakes Basin 1988, 1998, and 2000 Draft Report (No.1), July 13, 2000" prepared for Environment Canada.

[5] Bailey, R.E. (2001) Global hexachlorobenzene emissions, Chemosphere, 43:167-182.

[6] Ontario HCB release estimates in the Great Lakes Basin are based on the "Hexachlorobenzene sources, Regulations and Programs for the Ontario Great Lakes Basin 1988, 1998 and 2000 Draft Report (No. 1), July 13, 2000" prepared for Environment Canada by Benazon Environmental Inc., and updated with facility release data from the NPRI.

[7] Ontario B(a)P release estimates in the Great Lakes Basin are based on the "B(a)P/PAH Emissions Inventory for the Province of Ontario 1988, 1998 and 2000 Draft Report (No. 1), May 16, 2000" prepared for Environment Canada by Benazon Environmental Inc., and updated with facility release data from the NPRI.

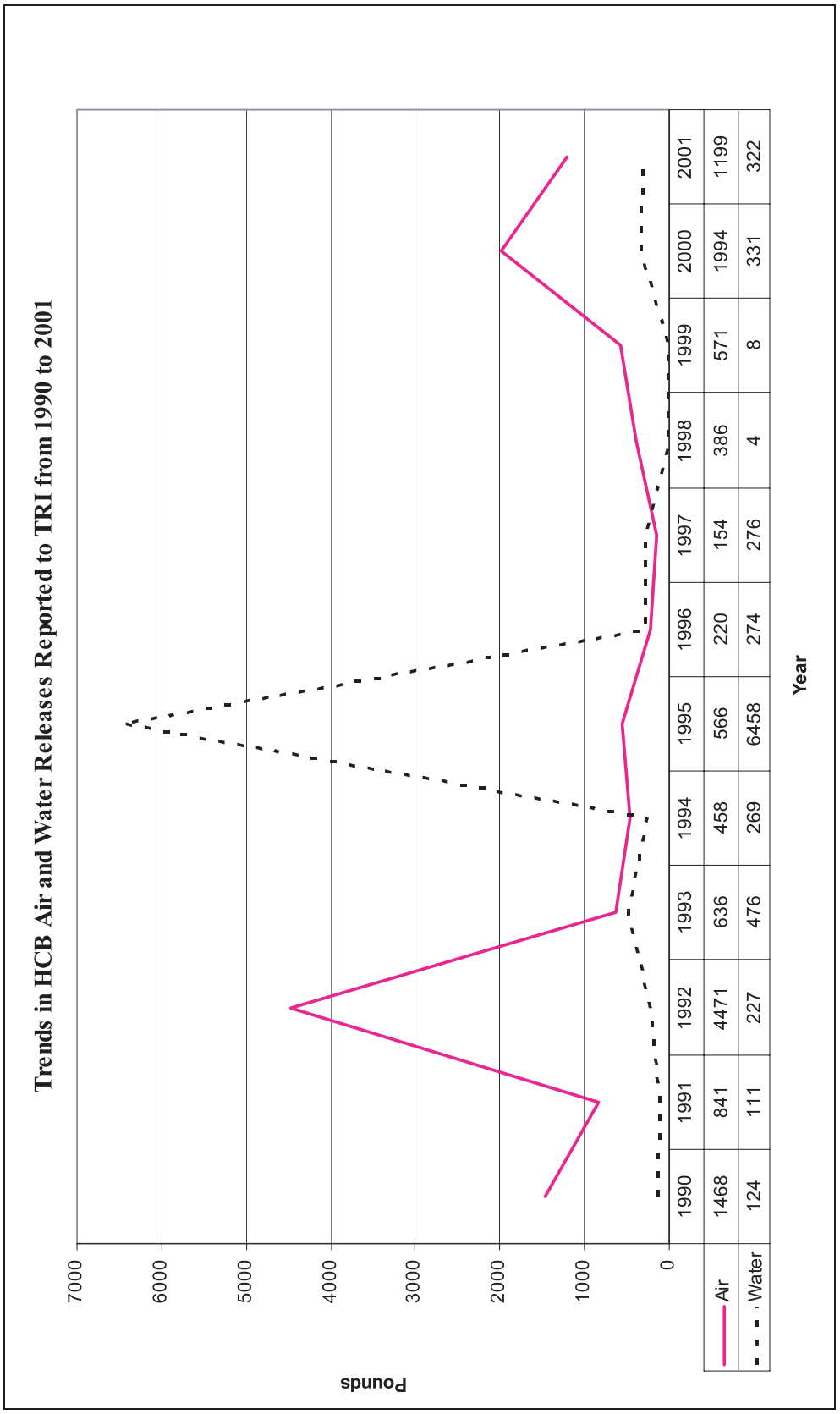


Figure 4-1. Trends in U.S. HCB Air and Water Releases Reported to TRI from 1990 to 2001, lbs/year.

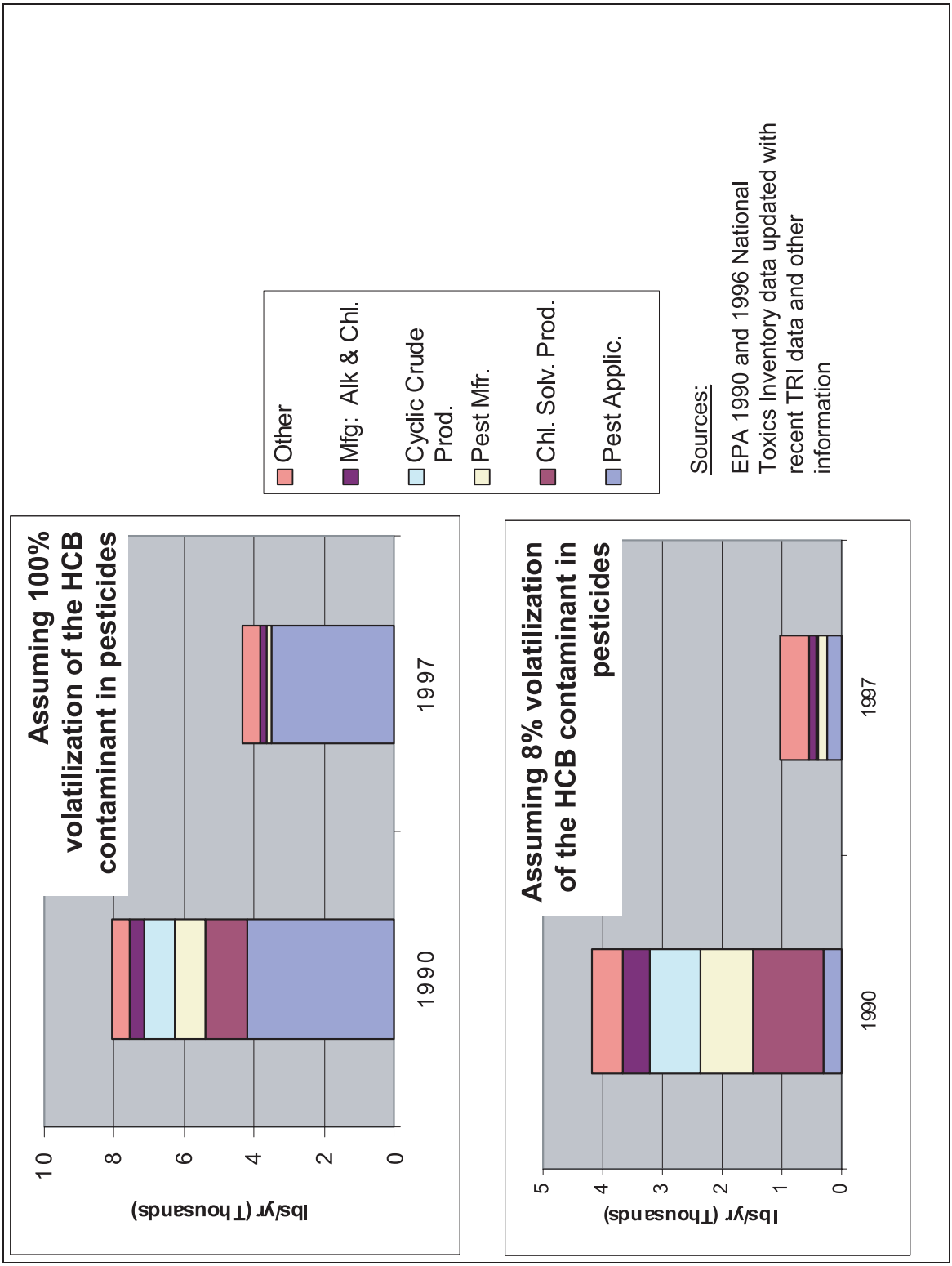


Figure 4-2. U.S. HCB Emissions, lbs/year.

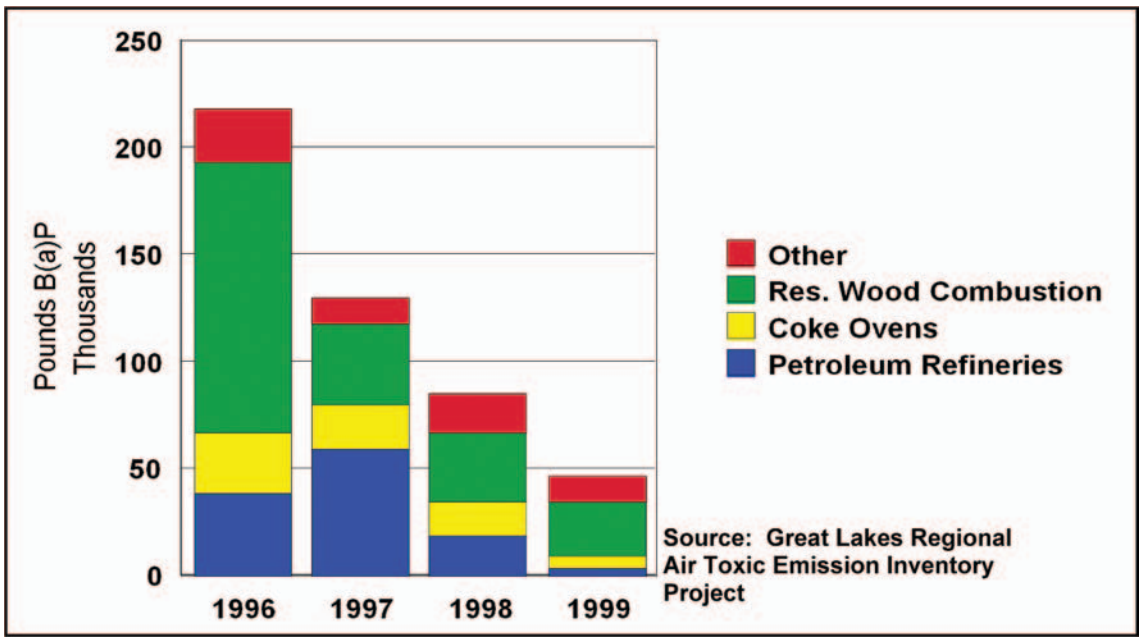


Figure 4-3. **B(a)P Emissions from the States and Province Around the Great Lakes, lbs/year.**

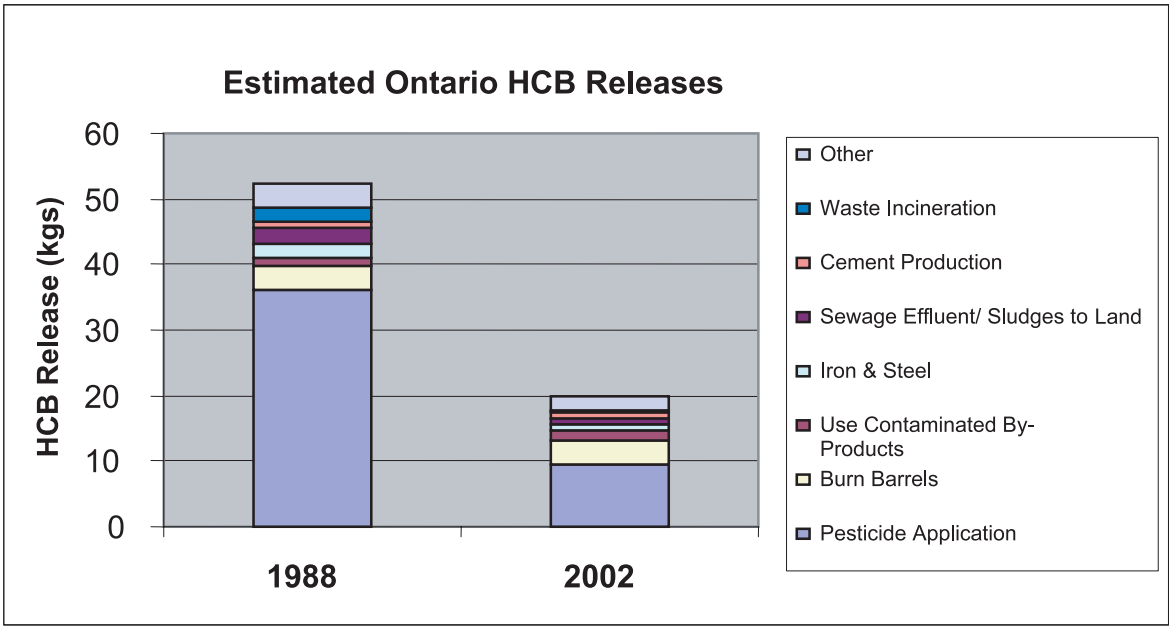


Figure 4-4. **Estimated Reductions in HCB Releases (kg/year) in Ontario from 1988 to 2002, by Sector. Source: Environment Canada**

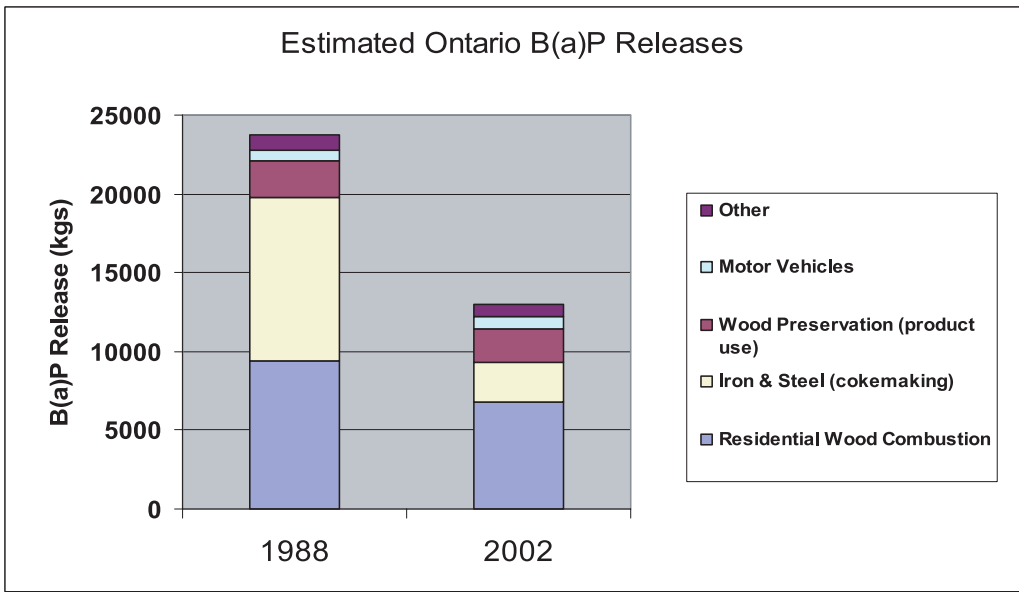


Figure 4-5. Estimated Reduction in B(a)P Releases (kg/year) in Ontario from 1988 to 2002, by Sector. Source: Environment Canada

were used by all States. The US EPA and the workgroup have been going through the 1996 NTI to check the accuracy of the HCB emission levels and to identify any emission reduction opportunities.

In 2003, Ontario HCB and B(a)P inventories were updated with new emission estimates for motor vehicles and the open burning of household waste (burn barrels). Rather than contributing toward overall release reductions, motor vehicles and burn barrel emissions have shown incremental increases over the years, highlighting the growing importance of these non-point sources. Another non-point source where the workgroup is involved in improving inventory uncertainties is the residential wood combustion sector, where a preliminary reassessment indicates that B(a)P releases may be overestimated. With respect to point sources, Canada's NPRI is considering a lower HCB reporting threshold for reporting year 2004. Along with NPRI 2002 emission data soon to be released, this will continue to refine the inventory information on facility releases.

Major uncertainty surrounds the release estimates associated with the use of several pest control products (herbicides, algaecides, fungicides, insecticides, and acaricides) containing trace HCB contamination levels. Current estimates, using maximum US EPA HCB product content limits and assuming all applied HCB is volatilized, suggest that pesticide application is the overwhelming HCB source within the Great Lakes Basin. The workgroup continues its efforts to close this critical data gap, and information gathered to date indicates trace contaminant levels may be much lower than the permitted maximum. Workgroup members are working with pesticide agencies and manufacturers to generate better HCB release numbers for this sector.

Voluntary Stack Testing: Since the initiation of the Voluntary Stack Testing Program in the spring of 2000, Environment Canada has conducted stack tests at eight volunteer facilities in Ontario for B(a)P, HCB, and many other substances of concern. Between 2000 and 2002, a nickel base metal smelter, two medical waste incinerators, a steel foundry, a Kraft boiler from a pulp mill, and a crematorium were tested. In 2003, an additional Kraft boiler from another pulp mill in Marathon and two animal carcass incinerators (Ecowaste and Burneasy) were tested. Results for the sources tested in 2003 will be available in mid-2004, and the test results will continue to be presented at GLBTS stakeholder meetings.

Scrap Tires: Millions of scrap tires burned in several catastrophic U.S. fires in 1999. For this reason, the more than 300 million scrap tires accumulated in stockpiles throughout the U.S. are a potential threat to human health and the environment. Tire fires are typically caused by wildfires, lightning strikes, and arson. These fires are nearly impossible to extinguish and can burn for months, generating considerable amounts of B(a)P in air emissions, groundwater contamination, and oily runoff. The scrap tire managers for the Great Lakes States and the Rubber Manufacturers Association were contacted to learn how each state is handling its scrap tires and potential ways that these fires can be minimized.

Reduction Activities

Wood Stove Change-Out Programs: The purpose of a wood stove change-out program is to encourage people to turn in pre-1992 wood stoves for newer wood stoves that meet US EPA standards or for pellet or gas stoves. A wood stove change-out program is the most effective way to reduce B(a)P emissions from residential wood

combustion because US EPA-certified stoves generate only about 15% of the emissions of older stoves, which account for about 90% of existing wood stoves. The Great Wood Stove & Fireplace Change-out Program, held in 2001 in Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, New York, North Dakota, Ohio, South Dakota, and Wisconsin, resulted in the replacement of at least 1,200 old stoves or stove inserts.

Wood-stove change-out programs are extremely important because residential wood combustion contributes over 50% of the B(a)P emitted to the Great Lakes Basin. Persuading Great Lakes residents to turn in their old wood stoves and inserts for cleaner burning appliances is one of the most effective strategies for achieving reductions.

US EPA initiated a project entitled "Voluntary Woodstove/Fireplace Smoke Reduction Activities and Outreach Materials" to encourage switching to gas and EPA-certified stoves and encourage best practices for the operation of woodstoves and fireplaces, as well as to develop outreach materials such as brochures and media outreach packages. These outreach materials will benefit the Binational Toxics Strategy's B(a)P reduction efforts.

The aim of the 1999 to 2003 Burn it Smart! Campaign, a national Canadian initiative led by Natural Resources Canada, was to reduce emissions by educating consumers through community-based wood heating workshops on the safety, health, and environmental aspects of residential wood burning, and on the various types of wood-burning appliances available, including high-efficiency, low emissions EPA-certified models. By the end of March 2003, approximately 5,800 Canadians attended some 300 workshops across Canada in 200 communities. In Ontario, approximately 1,300 citizens in 60 of these communities attended a workshop. In addition, two demonstration burn trailers showcasing the new advanced combustion technologies (US EPA-certified) were used ? one in British Columbia and one in Ontario. Non-government organizations that managed the workshops in Ontario were the Canadian Centre for Pollution Prevention, the Elora Centre for Environmental Excellence, and the Environmental Network in Collingwood. In Winter 2003, the Burn it Smart! Campaign presentation was updated and an urban-focused element was added. Over 40 workshops (including a set of pilot urban-focused workshops) will be completed in Ontario by April 2004 with greater marketing efforts to increase attendance at these workshops. In Spring 2004, two additional brochures will be produced (one on proper firewood and another on urban fireplaces).

Scrap Tires: The US EPA Region 5 Office of Solid Waste & Recycling and the Rubber Manufacturers Association have created an ad hoc group of industry experts to address the issue of stockpile abatement, while the Rubber Manufacturers Association is working with the California Fire Marshal's Office on a revised version of a tire fire prevention/fire fighting training program. These programs, coupled with increased markets for scrap tires in the Great Lake States, are effective tools to reduce the likelihood and severity of outdoor, uncontrolled tire fires.

The Ontario provincial government is proposing to amend used-tire site regulations in an effort to minimize the potential threat posed by these sites becoming breeding grounds for mosquitoes that may carry the West Nile virus. In June 2003, the Ontario provincial government issued orders for some 17 scrap-tire sites owners to remove tires or clean-up their sites.

Vehicle Emissions: GLBTS substance release inventory numbers for the on-road motor vehicle sector in Ontario were reassessed using updated emission factors and vehicle travel data. Previous estimates, which did not account for B(a)P in both the gas and particle phases, appear to have been underestimated. Comments on this inventory are currently being reviewed, and next steps to help improve the inventory are being considered with interested parties.

Iron & Steel: In spite of major release reductions over the last decade, the iron and steel sector is still the dominant B(a)P point source in the basin. In Ontario, voluntary Environmental Management Agreements (EMAs) are in place with two of the four integrated steel mills, targeting toxics substances including polycyclic aromatic hydrocarbons (PAHs) and B(a)P. In 1999, all four integrated mills adopted the Environmental Best Practice Manual – PAH to minimize emissions from coke making operations, and committed to a 60% reduction in PAHs/B(a)P releases by 2005 from a 1993 base year. Integrated steel producers in Ontario reduced PAH emissions per tonne of coke produced by 74% in 2002, relative to a 1993 base year. In absolute terms, PAH annual emissions were down 79%, or 150 tonnes. An independent third-party auditor verifies PAH emission levels on an annual basis at all four plants.

HCB Sources: Several facilities have reported reductions in HCB releases from 2000 to 2001 to the US EPA's TRI. These reductions are largely the result of facilities improving their methods for determining HCB emissions or reduced production levels at manufacturing plants.

Standards Development and Implementation: Canada-wide Standards (release limits) have been developed for mercury, particulate matter, ozone, benzene, and dioxins and furans. Implementation of these standards by the major source sectors and the province is expected to bring about HCB and B(a)P release reductions in the next 5-15 years.

Canadian Environment Ministers have agreed to undertake joint initial actions by 2005 to reduce emissions from residential wood-burning appliances by: (1) updating standards for new wood-burning appliances;

(2) exploring options for the development of a national regulation for new, clean-burning residential wood-heating appliances; (3) developing and implementing a national public education program on residential wood combustion; and (4) assessing options for a national wood stove upgrade or change-out program.

Recommendations from the Canadian Strategic Option Report for the wood preservation sector are in place. Audits against the Codes of Practice have been conducted for the three pentachlorophenol (PCP) facilities (one of these facilities also uses creosote to treat wood which contains B(a)P) in Ontario. Based on the audit assessment findings, each facility has developed a 5-year implementation plan to improve environmental performance. These plans were submitted by December 31, 2001, in accordance with the deadline set out in the voluntary program. Facilities are now implementing their plans to meet the objectives of the Codes and have begun submitting annual progress reports.

In 2003, HCB was added to the Schedule of the Prohibition of Certain Toxic Substances Regulations, 2003 (SOR/2003-99) in Canada. The regulations do not apply to scientific research and laboratory uses, pest control products, incidental by-products of the manufacturing process of a product, or substances present in a product at a concentration not exceeding 20 parts per billion. In addition, an Environment Canada study is underway to gather information on products that may contain HCB.

A US EPA final rule to control emissions of toxic air pollutants during hydrochloric acid production is expected to reduce HCB emissions.

Next Steps

Uncertainty remain with many of the HCB and B(a)P release estimates. The workgroup will continue to improve estimates, which are critical for developing viable reduction strategies and for measuring progress. Next steps include the following:

- Confirm HCB release estimates for the pesticide sector, and if needed, start discussions with stakeholders on reduction strategies;
- Assess results of a Canadian study on product contamination to verify product HCB contamination levels;
- Continue supporting the residential wood-burning initiatives in the basin, such as the wood stove change-out and Burn it Smart!-type programs to reduce wood-smoke pollution;
- Conduct studies to verify B(a)P release numbers from the motor vehicle sector;
- Consider continuing the voluntary stack testing program for selected sectors in the basin in an effort to close data gaps;
- Update current GLBTS inventories with new release data expected from national inventories; and
- Assess the use of trajectory analyses to help pinpoint remaining basin sources.

Emission inventories show that the dominant HCB and B(a)P basin releases are from non-point sources associated with fuel and waste combustion and the use of products containing trace levels of contamination. In general, known point sources of HCB and B(a)P are already committed to priority national or regional toxic reduction strategies or programs that will effect release reductions. The workgroup's major challenge going forward is to pursue reductions from non-point sources where technological and/or societal changes are needed (i.e., B(a)P emissions from fossil fuel and wood combustion processes, HCB emissions from pesticide application).

Chapel Rock, Picture Rock National Lakeshore Munising, Michigan Photo by Raymond J. Malace, Michigan Travel Bureau

5.0 INTEGRATION WORKGROUP

Integration Workgroup Highlights 2003

Integration Workgroup: The Integration Workgroup was established in 1998 to assist with organizational, administrative, process, and other cross-cutting issues that are relevant to, but outside the scope of the substance workgroups. The Integration Workgroup, which in the past has met on a quarterly basis, seeks to maintain a balanced, well-informed group of active stakeholders and recruit new members, as necessary, as it strives to:

- Broaden awareness of the GLBTS through public outreach;
- Identify potential voluntary persistent toxics reduction opportunities, including incentives for voluntary reductions;
- Assess the effectiveness of voluntary reduction projects;
- Keep abreast of substance workgroup activities, and provide guidance as appropriate;
- Resolve issues arising from differences in GLBTS implementation by the U.S. and Canada; and
- Provide a central point of contact for the GLBTS to other toxics programs, both domestic and international.

Meetings typically feature informational presentations from guest speakers on topics relevant to the GLBTS, followed by facilitated discussions and substance workgroup updates.

Over the past year, the Integration Workgroup convened the following meetings:

- February 25, 2003, in Windsor;
- May 15, 2003, in Windsor;
- September 11, 2003, in Toronto; and
- December 17, 2003, in Chicago.

Integration Workgroup Meeting – February 25, 2003, Windsor

The February 25 meeting focused on the topic of emerging environmental issues of concern in the Great Lakes Basin. A key presentation was a summary of proceedings of a workshop held earlier in the month at the Wingspread Conference in Racine, Wisconsin, sponsored by the International Joint Commission Science Advisory Board. The workshop brought together leading experts from several disciplines to address emerging chemical, physical, and biological stressors in the Great Lakes Basin ecosystem. Another key presentation commenced a discussion on the development of a protocol to identify emerging chemicals of concern to the Great Lakes Basin.

Presentations at this meeting included:

- *The Lake Erie POTW Project* – Abby Jarka, Delta Institute
- *Chemical Management Strategies* – Jill Kauffman Johnson, Chemical Strategies Partnership
- *Outreach and Reward Strategy for Accelerated Phase-out of PCBs* – Ken De, Environment Canada
- *Update Reports on Long-range Transport Workshop Planning and Environment Canada's Research Results on the Transport of Lindane into the Great Lakes Basin* – S. Venkatesh, Environment Canada
- *Extended Producer Responsibility: Protecting Jobs and the Environment* – Ken Bondy, Canadian Auto Workers
- *Report on the IJC Science Advisory Board Workshop on Emerging Chemicals of Concern in the Great Lakes Basin* – Deb Swackhammer, University of Minnesota
- *Chemical Evaluation Protocol* – Ted Smith, US EPA
- *The Canada-Ontario Agreement Harmful Pollutants Annex* – Tom Tseng, Environment Canada

Integration Workgroup Meeting – May 15, 2003, Windsor

The meeting continued a focus on developing a draft substance consideration process to identify new chemicals for the GLBTS. A cross-walk initiative to facilitate collaboration between the Lakewide Management Plans (LaMPs) and the GLBTS was also presented. Finally, a presentation was made summarizing the activities of the Severn Sound Municipal Pilot project, an initiative outcome of the Sector subgroup — a smaller working group of the Integration Workgroup — the previous year.

Presentations at this meeting included:

- *Communications Strategy: Crosswalk with LaMP Activities* – E. Marie Phillips, US EPA
- *Municipal Toxics Management Strategy: Progress Report on the Municipal Pilot with the Severn Sound Environmental Association* – Keith Sherman, Severn Sound Environmental Association
- Draft Substance Consideration Process – Ted Smith, US EPA

Integration Workgroup Meeting – September 11, 2003, Toronto

This meeting continued the discussions on chemical assessment, with a focus on current Level I substances, and also on the LaMP/GLBTS cross-walk initiative. The Integration Workgroup expressed concern that before the GLBTS takes on new chemicals, it should first evaluate the status of the current Level I chemicals and decide whether to continue work beyond 2006. The PCB Workgroup awarded Enersource Hydro, Hydro One, Slater Steel Inc., and Stelpipe Ltd with commemorative plaques for their work in eliminating PCBs. Finally, a presentation was made on Canada's efforts to address environmental issues under its agricultural policy initiative.

Presentations at this meeting included:

- *Elements of a New GLBTS Level I Substance Reassessment Process* – Ted Smith, US EPA, and John Menkedick, Battelle
- *Update on the Communications Strategy: Crosswalk with LaMP Activities* – E. Marie Phillips, US EPA
- *Presentation of Awards for PCB Reduction* – Ken De, Environment Canada
- *Canada's Agriculture Policy Framework: The Environment Chapter* – Mike Hicknell, Agriculture and Agri-Food Canada
- *Emerging Pollutants Workshop* – Ted Smith, US EPA
- *Overview of Long-range Transport Workshop* – S. Venkatesh, Environment Canada

Integration Workgroup Meeting – December 17, 2003, Chicago

The final meeting of the year for the Integration Workgroup was held in Chicago on December 17, 2003. This meeting featured presentations on efforts to model the long range transport of Strategy substances to the Great Lakes, and information on technology diffusion to help guide the workgroup's efforts. Updates on the following topics were also provided at the December meeting: Long Range Transport Workshop held on September 16-17, 2003; refinements to the proposed process for addressing Level I substances; and substance workgroup efforts.

Presentations at this meeting included:

- *Long Range Transport Workshop Outcomes* – S. Venkatesh, EC
- *Continental Modeling of GLBTS Substances to the Great Lakes* – Dr. Matthew MacLeod, US Department of Energy Lawrence Berkeley Laboratory
- *GLBTS Level I Substance Assessment Process – An update* – Ted Smith, US EPA
- *Technology Diffusion* – Dr. Tim Lindsay, Illinois Waste Management Resource Center

Conclusion

The Integration Workgroup will continue its work on refining and adopting a process for assessing Level I substances. Over the next year, it will also continue its efforts to identify opportunities for improved collaboration with LaMP initiatives, and seek ways by which it may assist the substance workgroups in meeting their respective goals.

Stakeholder Forum Highlights 2003

Stakeholder Forum: The Stakeholder Forum is convened biannually with the purpose of highlighting issues and initiatives of relevance to the Strategy. Over the past year, the following Stakeholder Forum meetings were convened:

- May 14, 2003, in Windsor, and
- December 16, 2003, Chicago.

Stakeholder Forum Meeting – May 14, 2003, Windsor

The theme for the May 14 Stakeholder Forum was "North American Toxics – One Continent, No Borders," and was designed to advance collaboration between the GLBTS and the North American Commission on Environmental Cooperation (CEC) Sound Management of Chemicals (SMOC) Workgroup. The meeting took place consecutively with the SMOC session the day prior, which provided the opportunity for co-attendance at both sessions.

Doug Wright, Program Director for the CEC, delivered the keynote address, which included a continental perspective on persistent toxic substances, and an overall review of SMOC programs. David Cowgill, of the Great Lakes National Program Office, US EPA, delivered a presentation on the U.S. Great Lakes Legacy Act and program, highlighting the objectives of the Act and the commitments made by the U.S. government to ensure efficacious implementation of its provisions. It was noted that sediments in Areas of Concern will be a priority in the program. Jim Maguire, of Environment Canada's National Water Research Institute, delivered a presentation on the long-range transport of North American toxics, addressing physical, chemical, and meteorological parameters that influence transport. Finally, substance workgroup co-chairs reported on achievements over the year, and reviewed challenges and next steps looking forward.

Stakeholder Forum – December 16, 2003, Chicago

The theme for the second Stakeholder Forum meeting of 2003 was "Global Toxics – No Borders." A presentation on Global POPs and Mercury, given by Dr. Paul Whylie, Project Manager for the United Nations Environmental Program (UNEP) Chemicals Program, addressed this theme. Dr. Whylie described the GLBTS as a global leader in reducing persistent toxic chemicals, and he urged the GLBTS to share its messages, methodologies, successes, and lessons learned with those who have not been as successful. Another presentation related to the theme was an update on progress made toward the long range transport challenge of the strategy, provided by Todd Nettesheim of the US EPA.

The morning session also included a discussion of the historical effects of dioxins on Lake Ontario Lake Trout populations, as well as updates by the substance workgroup co-chairs. The forum was followed by substance workgroup break-out sessions in the afternoon.

Mines Castle, Pictured Rocks National Lakeshore
Alger County, Michigan
Phototgraph Courtesy of Michigan Travel Bureau

6.0 PARTNERS AT WORK

This section presents summaries of stakeholder activities that contribute to the reduction of more than one Strategy substance. These summaries were submitted by GLBTS stakeholders.

Canadian Centre for Pollution Prevention

The following project areas and activities, undertaken by the Canadian Centre for Pollution Prevention (C2P2) over the past year, contribute to awareness building, education, and meeting the targets for reducing several GLBTS Level I persistent toxic substances.

Pesticides (including aldrin/dieldrin, chlordane, DDT, hexachlorobenzene, and mirex): C2P2 has been actively working with numerous groups to help reduce the use of pesticides, which would also contribute to potentially reducing the manufacture of Level I substances, as some are contaminants in the manufacture of pesticides that are currently sold in the U.S. and Canada:

- **Municipal Management Tool for Integrated Plant Health Care and Pesticide Reduction.** Under the direction of a small municipal steering group coordinated by Environment Canada-Ontario Region, C2P2 has worked to develop a Municipal Management Tool for Integrated Plant Health Care and Pesticide Reduction (known as the "Guide"). The Guide raises issues confronting municipalities as they embark on pesticide reduction initiatives. The Guide has been added to the Responsible Pest Management Website, which continues to be developed and maintained by C2P2 in partnership with the Federation of Canadian Municipalities. The website (www.pestinfo.ca) provides municipal governments and communities with access to information, tools, and networks that maximize opportunities for pesticide reduction.
- **Organic Luncheon at the Canadian Pollution Prevention Roundtable, Quebec City, 2003.** This year C2P2 initiated the contracting of caterers offering organic-certified food (non-pesticide grown foods) for a luncheon during the annual Canadian Pollution Prevention Roundtable and the purchase of "Fair Trade" coffee and teas during breaks.

Products of Incomplete Combustion (including B(a)P and dioxins/furans): C2P2 was involved in the delivery of Burn it Smart! workshops in Ontario, which educated individuals on the merits of operating clean and efficient wood-heating devices, and in the development of the Great Lakes Trash & Open Burning Website:

- **Burn it Smart! Regional Workshop Series.** C2P2 prepared and delivered public workshops on the subject of cleaner, safer, and more efficient residential wood heating. The target audience for the twelve C2P2 workshops held was central Ontario cottagers. C2P2 also helped roll out a national wood-heating education campaign under the direction of Natural Resources Canada. The residential wood combustion sector contributes to particulate matter and ground-level ozone, as well as the emission of benzo(a)pyrene and dioxins and furans, during incomplete combustion and burning of unsuitable materials in residential woodstoves. These emissions directly impact air quality.
- **Great Lakes Trash & Open Burning Website.** C2P2 developed the Great Lakes Trash & Open Burning Website (www.openburning.org), a reference/resource for the Burn Barrel subgroup of the GLBTS Dioxin/Furan Workgroup. This web-based outreach initiative involves promoting reductions in the open burning of household and solid waste to reduce environmental inputs of dioxin from these sources around the Great Lakes region.

Indiana Department of Environmental Management

The Indiana Department of Environmental Management (IDEM) reports the following results of toxics reduction efforts in the state of Indiana.

Toxic Release Inventory: IDEM's Office of Pollution Prevention & Technical Assistance released the results of the latest EPA Toxic Release Inventory in a press release on June 30, 2003. The release provided data for 2001, which indicated that toxic releases in Indiana dropped by approximately 9% during that year. Although much of the reduction was likely due to a drop in the economy, there were pollution prevention success stories that resulted in lower toxic releases. For information, visit the IDEM website at www.in.gov/idem/oppta/tri/.

Toxics Reduction Challenge: In 1998, Governor Frank O'Bannon issued a Toxics Reduction Challenge in Indiana. The challenge consists of a pledge to:

1. Support the state's goal to reduce toxic chemical releases to the air and water from 1995 levels:
   - 50% by December 31, 2000, of carcinogens and PBT chemicals in large urban areas;
   - 60% by December 31, 2002, statewide for these chemicals; and
   - 50% by December 31, 2002, statewide for all toxic chemicals reported in TRI.
2. Energetically help the state reach these goals through efforts emphasizing pollution prevention within an organization and/or in cooperation with other organizations.

To evaluate the first goal of the challenge, air and water releases of carcinogens and PBTs (reported to TRI) were assessed in regions of the state that have significant manufacturing activities. These regions encompass the northern, northwest, southwest, and central parts of Indiana. The goal was to achieve a 50% reduction before 2001 for those facilities reporting to the Toxic Release Inventory in 1995 in those regions. Of the four regions, all but one greatly exceeded the 50% goal. The northwest and southwest regions made 71% and 68% reductions by 2001, and central Indiana had the largest decrease of 82%. Unfortunately, the northern region did not officially meet this goal. This was likely due to a change in the way styrene emissions were calculated. It is very difficult to determine actual emissions in the northern region for the year 2000. However, large decreases in toxic releases in the 2002 Governor's Challenge data for the northern region are expected.

To evaluate the second goal of the challenge, air and water releases of carcinogens and PBTs (reported to TRI) were assessed throughout the entire state. This goal was to achieve a 60% reduction before 2003 for those facilities reporting to the Toxic Release Inventory in 1995. While the data for 2002 is not yet final, the 2001 numbers indicate that Indiana is on track to meet the goal. In 2001, carcinogens and PBTs were reduced by over 45%.

For the third goal, the challenge was to reduce all toxic chemical releases, beyond reductions in carcinogens and PBTs, to the air and water by 50% before 2003 for those facilities reporting to TRI in 1995. Again, based on 2001 TRI data, a 47% reduction has already been achieved, and all indications are that Indiana should meet this goal, if not exceed it.

If the 2002 TRI data (likely to be released in 2004) trends continue as expected, the challenge should prove to be successful.

INFORM Inc.'s Purchasing for Pollution Prevention Project

INFORM Inc. is an independent research organization in the U.S. that examines the effects of business practices on the environment. INFORM's Purchasing for Pollution Prevention Project has helped state and local governments in the Great Lakes region develop and issue new bid specifications for products devoid of mercury, lead, and other PBTs. Practical and cost-effective substitutes were identified for PBT-containing lighting and HVAC equipment, appliances, medical supplies, lice treatment, traffic-marking paint, vehicles, and electronics.

Some specific impacts of this project over the last year include the following:

- INFORM assisted the State of Minnesota in adopting model "Clean Car" specifications that prompted automakers to replace mercury switches in new models a year earlier than projected, eliminating approximately 200 pounds of mercury.
- INFORM helped the New York State Office of General Services and Department of Transportation to end the state's use of traffic paint containing lead chromate. This decision will prevent 130,000 pounds of lead from being applied to roads in New York by state and local government agencies.
- Erie County, NY prevented one ton of para-dichlorobenzene-based restroom deodorizers from going into sewers after an evaluation determined that less-toxic and longer-lived alternatives were relatively cost competitive. The manufacture of para may generate hexachlorobenzene. Erie County also cancelled its use of Trifluralin pesticides in a habitat restoration area after INFORM revealed that this PBT herbicide is highly toxic to aquatic species; vendors had encouraged its use as "virtually non-toxic to humans."
- Wisconsin issued a new mercury-free medical supplies contract and is disseminating information on mercury-free thermometers and blood pressure cuffs to community health facilities statewide.

To facilitate transfer of information on practical PBT-free products, model specifications, and case studies, INFORM posted fact sheets on the web at http://www.informinc.org/p3_00.php.

Trout Fishing on Newton Creek
Harrison, Michigan
Photograph Courtesy of MichiganTravelBureau

7.0 SEDIMENTS CHALLENGE

Under the Great Lakes Binational Toxics Strategy, EC and the US EPA committed to:

"Complete or be well-advanced in remediation of priority sites with contaminated bottom sediments in the Great Lakes Basin by 2006."

Highlights of sediment assessment and remediation activities undertaken in the U.S. and Canada are described below.

2003 Sediment Assessments with US EPA's Research Vessel Mudpuppy

Contaminated sediments are a significant concern in the Great Lakes Basin. Although toxic discharges have been reduced over the past 30 years, high concentrations of contaminants still remain in the sediments of many rivers and harbors. These sediments are of potential risk to the health of aquatic organisms, wildlife, and humans.

To assist in determining the nature and extent of sediment contamination at these polluted sites, the US EPA's Great Lakes National Program Office (GLNPO) provides the Research Vessel (R/V) Mudpuppy. The R/V Mudpuppy is a 32-foot-long, flat-bottom boat that is specifically designed for sampling sediment deposits in shallow rivers and harbors. The boat is able to sample at water depths between 2 feet and 50 feet. Using a vibrocoring unit, the R/V Mudpuppy can take sediment core samples of up to 15 feet in depth.

To adequately characterize a site, GLNPO uses an integrated sediment assessment approach. This involves collecting data for sediment chemistry, toxicity, and the benthic community at a specific site, and then using the results to determine the extent of contamination that could be impacting the aquatic ecosystem.

Since 1993, the R/V Mudpuppy has conducted surveys at 39 locations, including 27 of the 31 Great Lakes Areas of Concern (AOCs). In 2003, the following surveys were conducted with the assistance of the R/V Mudpuppy:

- Black Lagoon, MI – Assisted the Michigan Department of Environmental Quality (MDEQ) with sampling to obtain additional chemical and physical data to inform the design of a sediment remediation project;
- Pere Marquette, MI – Collected samples with MDEQ to determine if the sediments are a source of PCB contamination in the fish within Pere Marquette Lake;
- Raisin River, MI – collaborative effort between GLNPO and the MDEQ to determine the levels of PCB contamination in sediments underlying the federal navigation channel;
- Saginaw River, MI – Post-remediation sediment assessment as part of a GLNPO grant with MDEQ;
- St. Mary's River / Munuscong Lake, MI – Sediment quality survey as part of a GLNPO grant to Lake Superior State University;
- Tittabawasse/Saginaw Rivers, MI – Collection of sediment dioxin data in the Saginaw River and three of its tributaries;
- Buffalo River, NY – Water and sediment quality characterization as part of a GLNPO grant to SUNY Buffalo; and
- Ashtabula River, OH – Assisted the U.S. Army Corps of Engineers with sampling to provide the analytical data necessary for the technical support of the dredging, handling, dewatering, water treatment, transport, and disposal of dredged sediments from the Ashtabula River.

Great Lakes Sediment Remediation Projects

In 2002, approximately 183,000 cubic yards of sediment were remediated from six U.S. sites and one Canadian site in the Great Lakes Basin. All of these sites initiated work for the first time in 2002, except Pine River, which was in its fourth year of operation. Several of the projects are expected to continue with the remediation of contaminated sediment into 2003. The following is a list of specific details about each site.

U.S. Sites

U.S.S. Lead Refinery, Inc: From August to September 2002, U.S.S. Lead began excavation of contaminated sediments from on-site wetlands bordering the Grand Calumet River. About 10,000 cubic yards of sediment were placed in an on-site Corrective Action Management Unit for disposal. Oversight of this project was conducted by both the US EPA and IDEM.

Ten-Mile Storm Drainage System PCB Spill Site: In July 2002, at the request of the Michigan Department of Environmental Quality (DEQ), the US EPA Superfund initiated a cleanup in St. Clair Shores, Michigan, to remove high levels of PCBs that were illegally dumped into a storm drainage system. Superfund removed all sediment with PCB concentrations in excess of 10 ppm, a total of 18,500 cubic yards of sediment. Macomb County and the City of St. Clair Shores plan to follow up with the removal of the remaining contamination.

U.S. Steel – Gary Works: The US EPA began oversight of a large dredging project in Northwest Indiana to remove

a total of 750,000 cubic yards of contaminated sediment from the Grand Calumet River. In 2002, roughly 11,000 cubic yards of sediment were dredged which contained high levels of PCBs, heavy metals, and PAHs. This project was scheduled to be completed by October 2003.

Moss-American Site: As part of a consent decree, Kerr-McGee Chemical removed 10,000 cubic yards of PAH-contaminated sediment from the Little Menomonee River with oversight from both the US EPA Superfund and WDNR. Since the river was relatively small, a large portion was rerouted and the contaminated sediment was then removed. The clean soil removed during the reroute process was used as backfill in the former channel.

Pine River: During the fourth year of sediment work on the Pine River in Michigan, 72,100 cubic yards of contaminated sediment were removed by the US EPA Superfund. This remedial action eliminated roughly 244,000 pounds of DDT from the river, and sediments were disposed of at several non-hazardous waste landfills.

Tannery Bay: Based upon a consent degree with Genesco Corporation issued through a Michigan DEQ Water Division action, approximately 60,000 cubic yards of contaminated sediment were removed from Tannery Bay in 2002. The site had high concentrations of chromium, arsenic, and mercury, and was also impacted by animal hides, hairs, and dyes used in the tanning process. An additional 15,000 cubic yards of contaminated sediment is scheduled to be removed in 2003.

Figure 7-1 presents the cumulative volume of sediment remediated in the U.S. since 1997.

Canadian Sites

The following information pertains to some of the key initiatives on sediment assessment and remediation-related activity carried out in Canadian AOCs during 2002. The previous GLBTS progress reports should be referred to for additional information on sediment issues in the Canadian AOCs.

St. Clair River: Dow Chemical Canada Inc. undertook a pilot dredging project in 2002 for contaminated sediments adjacent to its industrial plant site at Sarnia, Ontario. The pilot project involved the hydraulic dredging of 2000 cubic metres of sediment with subsequent dewatering and storage of dry sediment on site for future disposal. Information from the pilot project was used to design the full-scale remedial work to be carried out in 2003 and 2004. The total volume of sediments involved with this remedial project is estimated to be 25,000 cubic metres. Contaminants in the sediments include the GLBTS Level I substances mercury, HCB, and octachlorostyrene, and the Level II substance hexachlorobutadiene.

Port Hope Harbour: Remedial investigations on harbour sediments are focusing on the uranium series radionuclides and secondarily on heavy metal contamination, particularly arsenic, copper, lead, and nickel. Remediation is linked to the development of facilities in the Port Hope area for the long-term management of low-level radioactive waste pursuant to a March 2001 agreement between the federal government and the Town of Port Hope and adjacent municipalities. GLBTS substances include some marginal contamination of PCBs and polycyclic aromatic hydrocarbons (Level II substances).

Further sediment studies have been conducted in the harbour in 2002. These studies will help to define the extent of contamination to guide future remedial work and also to develop site-specific cleanup criteria based on measured effects on biota.

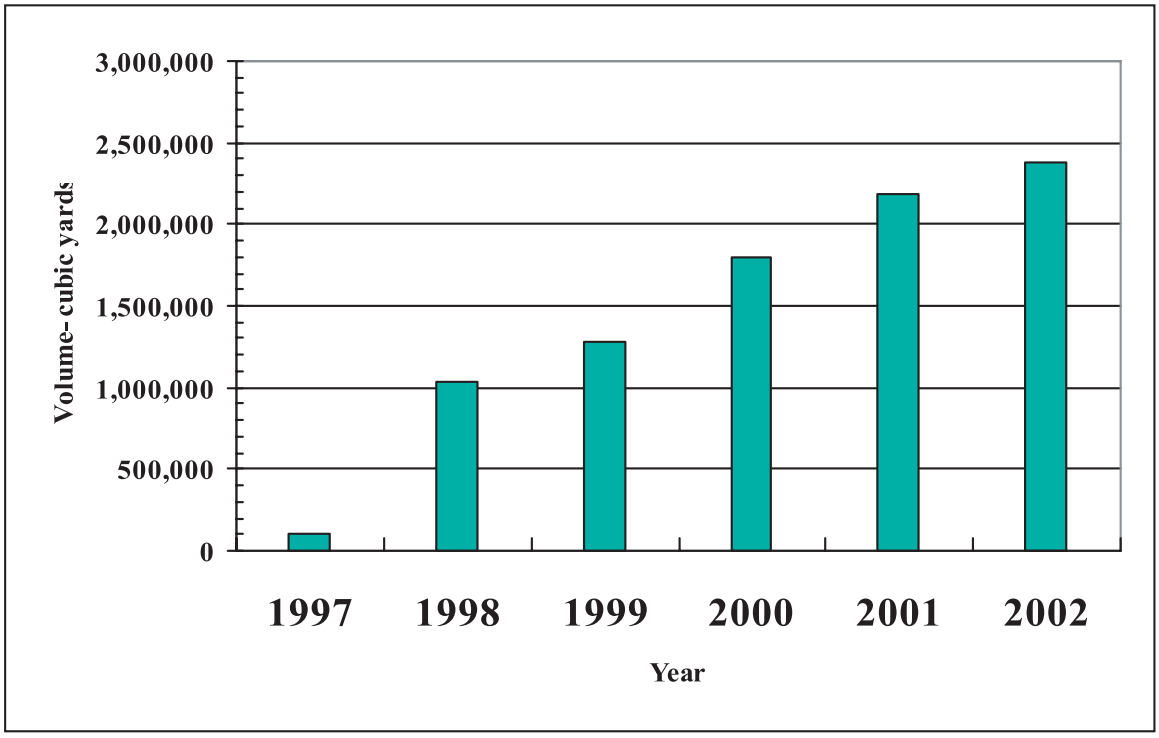
Thunder Bay Harbour (Northern Wood Preservers): Approximately 11,000 cubic metres of contaminated sediment (above 150 ppm PAH) had been dredged at this site and placed in an engineered bioremediation cell on site. Remediation criteria were not being met over the period September 1998 to February 2000, and the decision was made to utilize an alternate technology. The sediments were subsequently treated using thermal desorption in 2001, and treatment concluded in 2002. Post-project monitoring and evaluation are continuing.

Severn Sound: The Severn Sound AOC has been impacted by excessive nutrient enrichment and eutrophication. Remedial activities have focused on sewage treatment plant upgrades, improvements in private sewage systems, urban stormwater management, and stream and shoreline habitat rehabilitation. Assessments and monitoring of sediments have been undertaken, and in 2001 it was concluded that impairments relating to degradation of benthos and restrictions on dredging have been overcome. No sediment interventions are planned, and residual sediment contamination will be left to natural recovery.

In October 2002, the IJC met with Canadian Environment Minister David Anderson to present a letter concurring that the Severn Sound AOC has been restored, under the Great Lakes Water Quality Agreement.

St. Lawrence River (Cornwall): Contamination issues here are primarily associated with mercury, and a sediment strategy is under development with federal and provincial agencies and Cornwall stakeholders. Work in 2002 concentrated on further studies and analyses on benthic community impairment and bioaccumulation. Results and recommendations were discussed. Stakeholder meetings were held in June 2003, and a final decision on the sediment strategy is expected in late 2003.

Supporting Table and Graphics: Table 7-1 reports progress on sediment remediation projects at both Areas of Concern and non-Areas of Concern in the U.S. and Canada, from 1997 to 2002. The maps on the following pages illustrate the progress and achievements made in sediment remediation activities in the Great Lakes from 1997 to 2002. (Information included in the tables and maps is quantitative as reported by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.)



*Information included in figure is quantitative *as reported* by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.

Figure 7-1. Cumulative Volume of Sediment Remediated in the U.S. Since 1997.* Data Source: US EPA

Table 7-1. Progress on Sediment Remediation in the Great Lakes since 1997.*

Site/AOC/non-AOC	Cumulative Mass of Contaminant Removed (kg)												Cumulative Volume Sediments Removed 1997 to 2002 (cy)	Volume Sediments Removed 2002 (cy)	Ultimate Disposition
	aldrin/ dieldrin	benzo(a) pyrene	chlordane	DDT (+DDE/DDD)	Hexachlorobenzene	alkyl-lead	mercury & compounds	mirex	octachloro styrene	PCBs	dioxins and furans	toxaphene			
U.S. Sites															
Ashtabula River, OH															
Black River-S. Branch, MI															
Black River, OH															
Buffalo River, NY - Buffalo Color - Area D													45,000		capped
Clinton River, MI															
Cuyahoga River, OH															
Deer Lake-Carp River, MI															
Detroit River, MI - Monguagon Creek													25,000		landfilled
Eighteen Mile Creek, NY															
Fields Brook Superfund, OH													42,000		landfilled
Fox River, Green Bay, WI - Deposit 56/57 - Deposit N										22,865 22,815 50			87,500 80,300 7,200		landfilled
Grand Calumet, IN - U.S. Steel/Gary Works - U.S.S. Lead										1,031			24,200 14,200 10,000	11,000 10,000	corrective action mgmt. unit
Kalamazoo River, MI - Bryant Mill Pond										10,000			150,000		landfilled
Manistee Lake, MI															
Manistique River, MI													123,000		landfilled
Manitowoc River, WI - HARP										425			11,800		landfilled

*Information included in matrix reports is quantitative as reported by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.

Table 7-1. Progress on Sediment Remediation in the Great Lakes since 1997* (continued).

Site/AOC/non-AOC	Cumulative Mass of Contaminant Removed (kg)												Cumulative Volume Sediments Removed 1997 to 2002 (cy)	Volume Sediments Removed 2002 (cy)	Ultimate Disposition
	aldrin/ dieldrin	benzo(a) pyrene	chlordane	DDT (+DDE/DDD)	hexachlorobenzene	alkyl-lead	mercury & compounds	mirex	octachloro styrene	PCBs	dioxins and furans	toxaphene			
U.S. Sites															
Maumee River, OH - Fraleigh Creek										25,400			8,000		landfilled
Menominee River, MI/WI - Ansul Eighth Street Slip - Moss American													**33,000** 23,000 10,000	10,000	landfilled/awaiting further mgmt
Milwaukee Harbor, WI - North Ave. Dam													8,000		landfilled
Muskegon Lake, MI															
National Gypsum - Alpena, MI															
Niagara River, NY - Scajaquada Creek - Cherry Farm/River Road - Niagara Transformer													71,000 17,500 42,000 11,500		landfilled
Pine River, MI				470,569									332,100	72,100	landfilled
Presque Isle Bay, PA															
River Raisin, MI										16,795			27,000		on-site TSCA facility
Rochester Embayment, NY															
Rouge River, MI - Evan's Product Ditch - Newburgh Lake										250,000 4,000 246,000			407,000 7,000 400,000		off-site TSCA facility and landfilled
Saginaw River/Bay, MI										4,500			342,500		off-shore CDF
Sheboygan Harbor, WI															
St. Clair River, MI															

*Information included in matrix reports is quantitative as reported by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.

Table 7-1. Progress on Sediment Remediation in the Great Lakes since 1997* (continued).

Site/AOC/non-AOC	Cumulative Mass of Contaminant Removed (kg)												Cumulative Volume Sediments Removed 1997 to 2002 (cy)	Volume Sediments Removed 2002 (cy)	Ultimate Disposition
	aldrin/ dieldrin	benzo(a) pyrene	chlordane	DDT (+DDE/DDD)	hexachlorobenzene	alkyl-lead	mercury & compounds	mirex	octachloro styrene	PCBs	dioxins and furans	toxaphene			
U.S. Sites															
St. Lawrence River, NY - Reynolds Metals/Alcoa East										10,000			86,000		landfilled/capped
St. Louis River/Bay, MN/WI															
St. Marys River, MI													3,000		landfilled
Ten-Mile Storm Drain - St. Clair Shores, MI													18,500	18,500	landfilled
Torch Lake, MI															
Waukegan Harbor, IL															
Waxdale Creek, WI															
White Lake, MI - Tannery Bay													60,000	60,000	landfilled
Willow Run Creek, MI										200,000			450,000		on-site TSCA facility
Wolf Creek - Tributary, MI															
TOTALS				**470,569**						**541,016**			**2,354,600**	**181,600**	

*Information included in matrix reports is quantitative as reported by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.

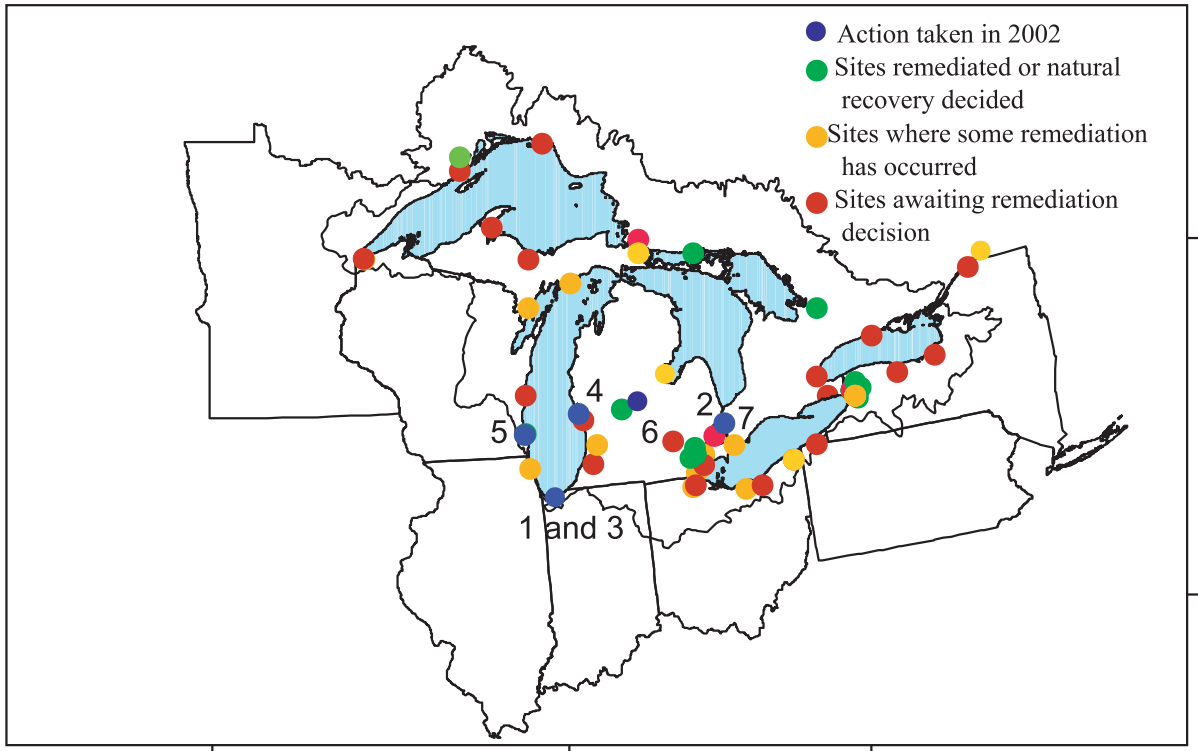
Table 7-1. Progress on Sediment Remediation in the Great Lakes since 1997* (continued).

Site/AOC/non-AOC	Cumulative Mass of Contaminant Removed (kg)												Cumulative Volume Sediments Removed 1997 to 2002 (cm)	Volume Sediments Removed 2002 (cm)	Ultimate Disposition
	aldrin/ dieldrin	benzo(a) pyrene	chlordane	DDT (+DDE/DDD)	hexachlorobenzene	alkyl-lead	mercury & compounds	mirex	octachloro styrene	PCBs	dioxins and furans	toxaphene			
Canadian Sites															
Thunder Bay - Northern Wood Preservers		2,700											11,000 21,000		Thermal treatment Berm enclosed & capped
Nipigon Bay															
Jackfish Bay															
Peninsula Harbour															
St. Marys River															
Spanish River															
Severn Sound															
St. Clair River							19.3						2,000	2,000	
Detroit River															
Wheatley Harbour															
Niagara River (Ontario)															
Hamilton Harbour															
Metro Toronto															
Port Hope															
Bay of Quinte															
St. Lawrence River (Cornwall, Ontario)															
TOTALS		**2,700**					**19.3**						**34,000**	**2,000**	

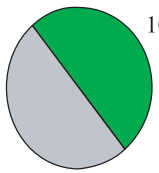
*Information included in matrix reports is quantitative as reported by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.

Great Lakes Sediment Remediations in 2002*

*Information included in the map is quantitative *as reported* by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.

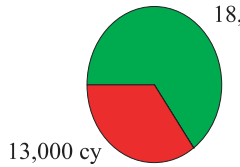


1. U.S.S. Lead Refinery Inc.
East Chicago, Indiana

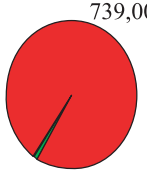


UNDETERMINED

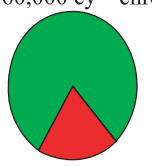
2. Ten Mile Storm Drain
St. Clair Shores, Michigan



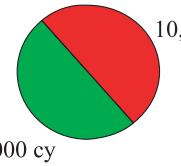
3. U.S. Steel Gary Works
Gary, Indiana



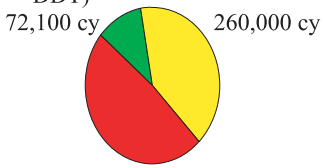
4. Tannery Bay
White Lake, Michigan



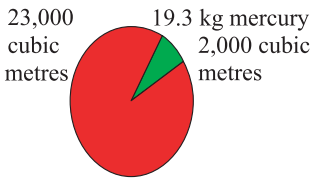
5. Moss American
Milwaukee, Wisconsin

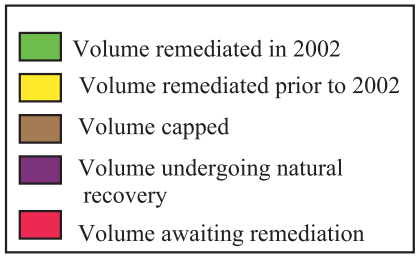


6. Pine River, Michigan



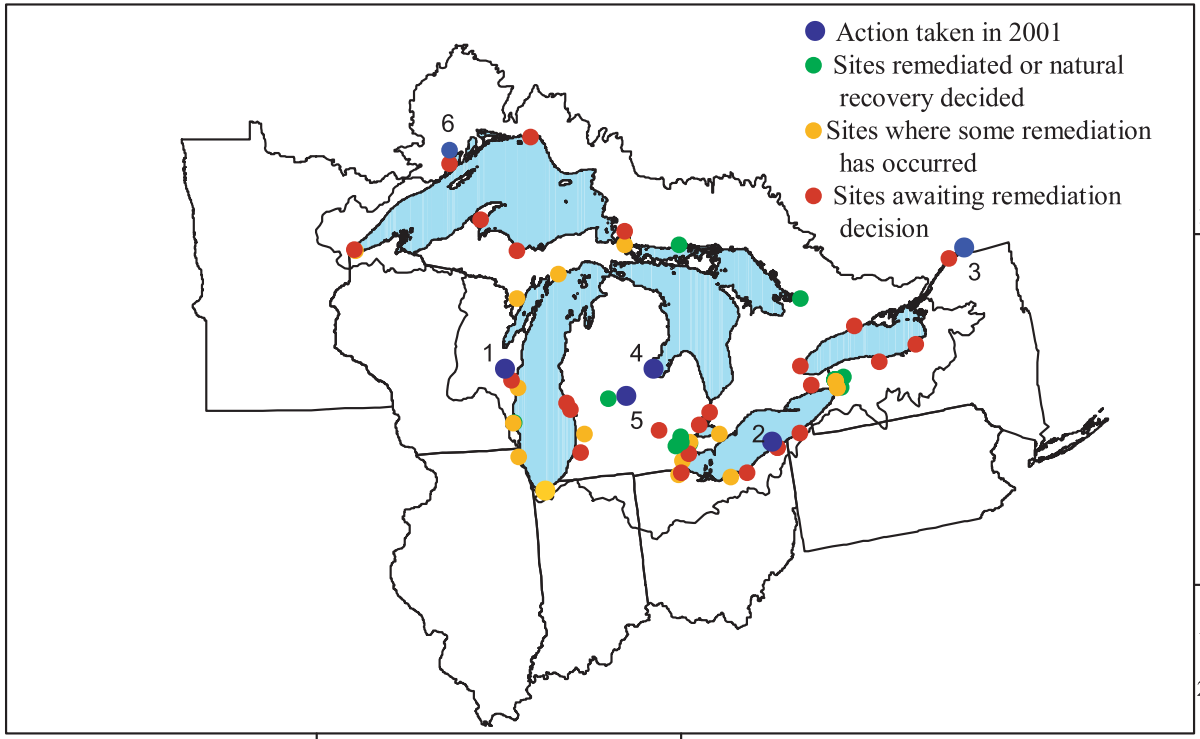
7. St. Clair River -
DOW Chemical Canada



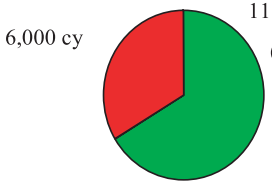


Great Lakes Sediment Remediations in 2001*

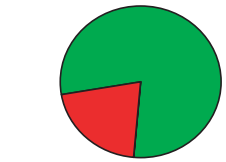
*Information included in the map is quantitative *as reported* by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.



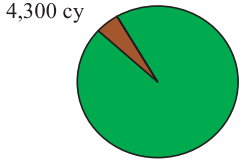
1. Hayton Area Remediation Project - OU1 – Source Abatement, Wisconsin



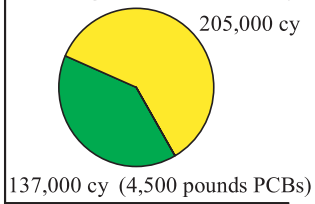
2. Fields Brook Superfund Site, Ohio



3. Reynolds Metals/Alcoa East St. Lawrence River

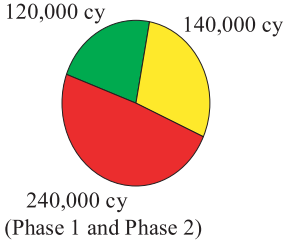


4. Saginaw River & Bay

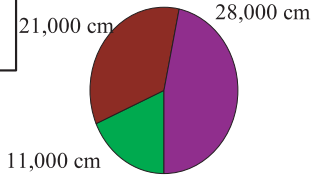


5. Pine River, Michigan

(50,300 pounds DDT)



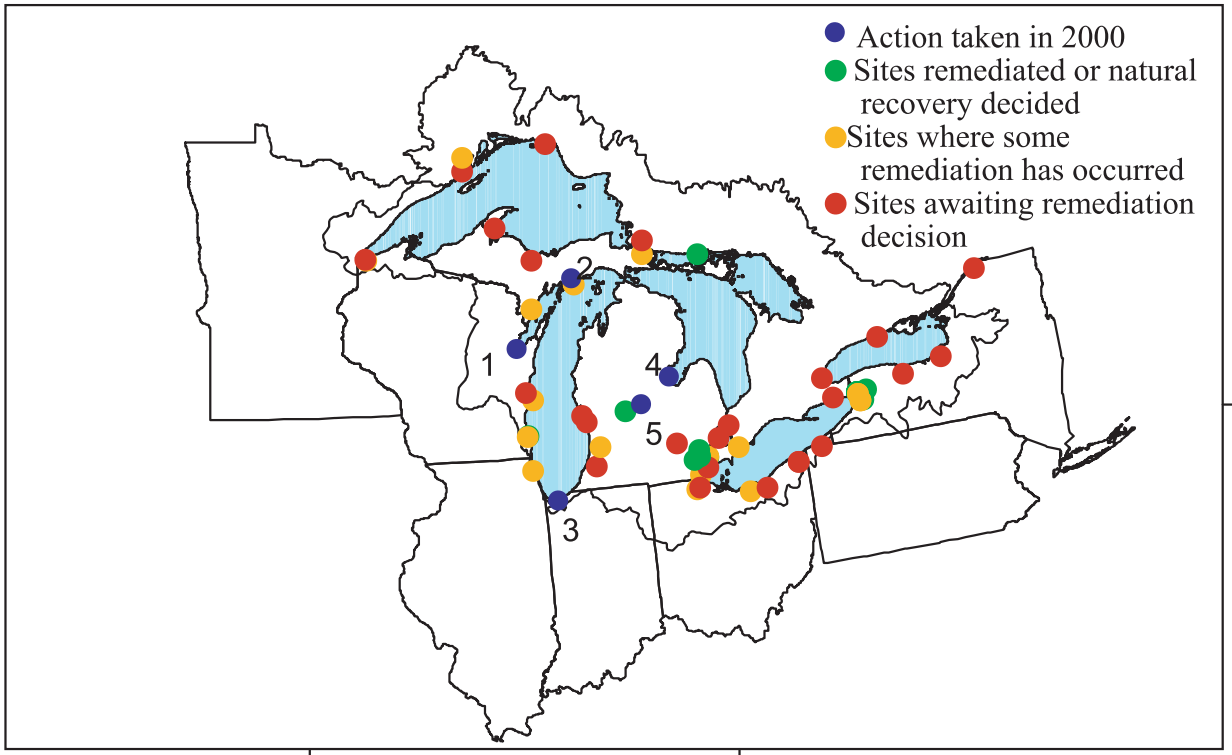
6. Thunder Bay – Northern Wood Preservers, Ontario



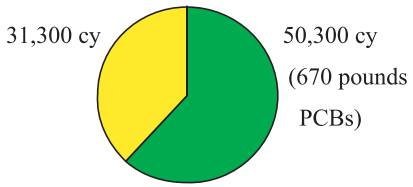
Volume remediated in 2001
Volume remediated prior to 2001
Volume capped
Volume undergoing natural recovery
Volume awaiting remediation

Great Lakes Sediment Remediations in 2000*

*Information included in the map is quantitative *as reported* by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.

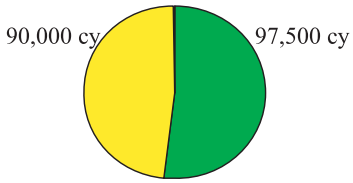


1. Fox River Deposit 56/57

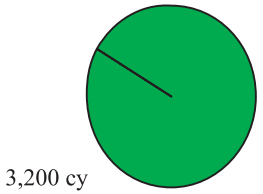


10,900,000 cy total in Fox River

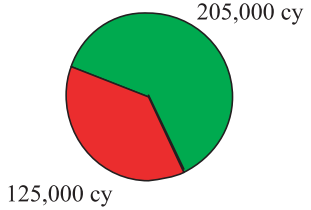
2. Manistique River & Harbor Emergency Removal



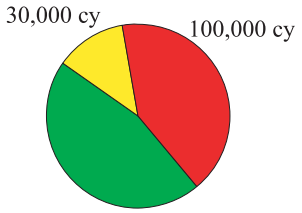
3. USX Vessel Slip Project Lake Michigan

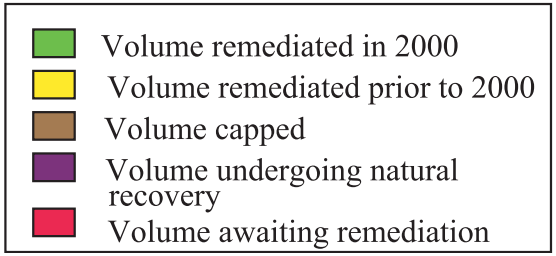


4. Saginaw River & Bay



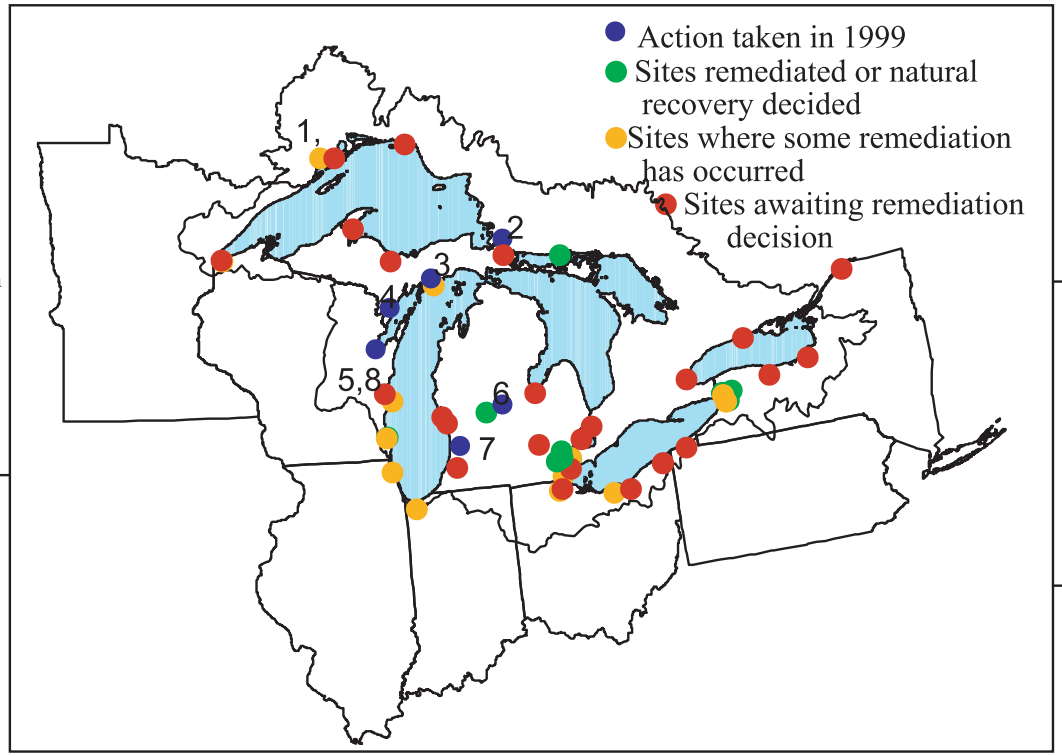
5. Pine River



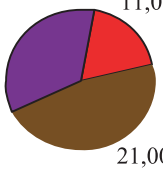


Great Lakes Sediment Remediations in 1999*

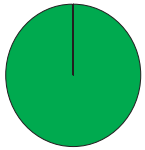
*Information included in the map is quantitative *as reported* by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.



1. Thunder Bay Northern Wood Preservers

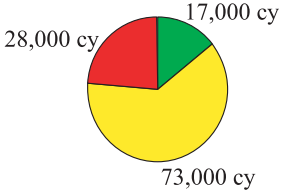


2. St. Mary's River

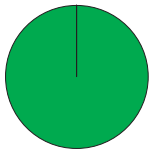


Remainder of contaminated sediments undergoing natural attenuation

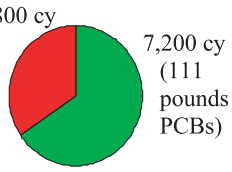
3. Manistique River and Harbor



4. Menominee River Ansul Eighth Street Slip



5. Fox River Deposit N

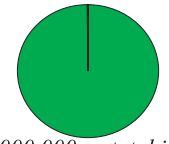


10,900,000 cy total in Fox River

8. Fox River Deposit 56/57

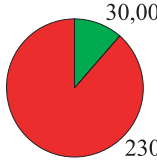
10,900,000 cy total in Fox River

7. Kalamazoo River Bryant Mill Pond



7,000,000 cy total in Kalamazoo R.

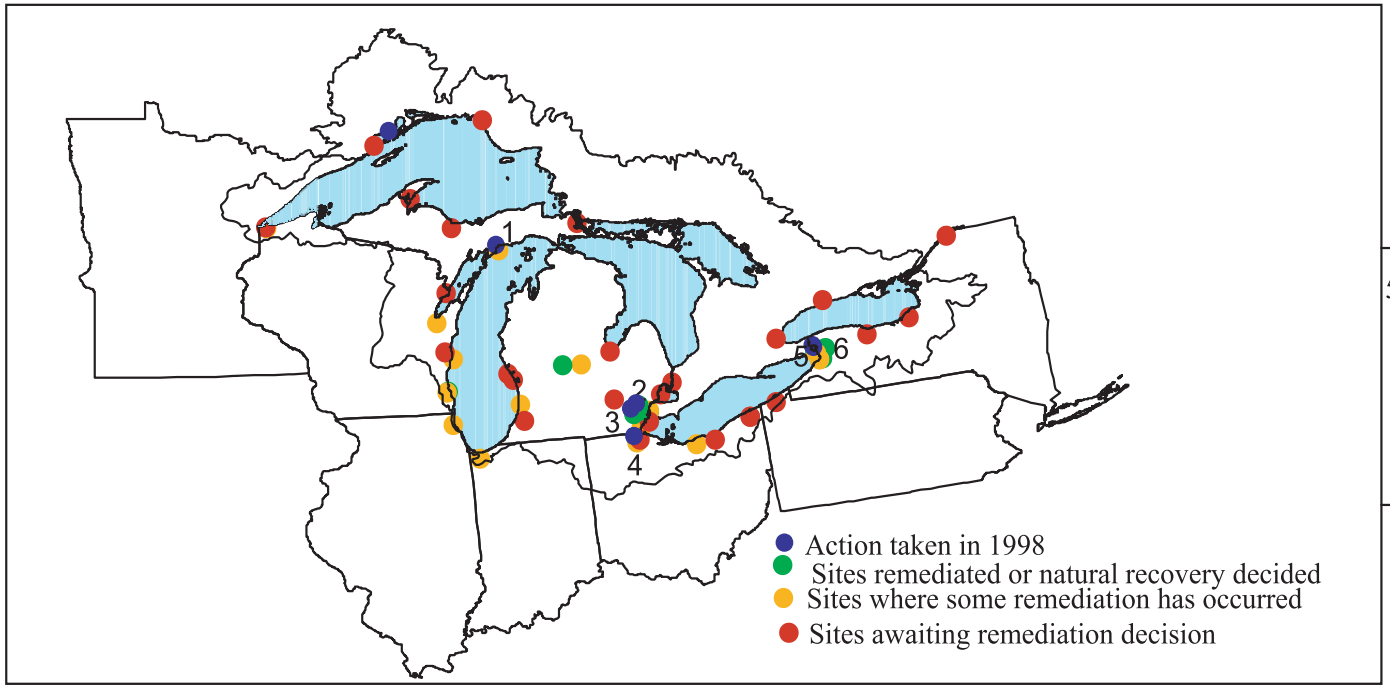
6. Pine River



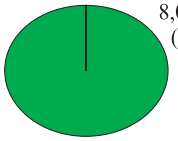
- Volume remediated in 1999
- Volume remediated prior to 1999
- Volume capped
- Volume undergoing natural recovery
- Volume awaiting remediation

Great Lakes Sediment Remediations in 1998*

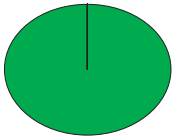
*Information included in the map is quantitative *as reported* by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.



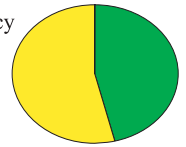
4. Ottawa River - Unnamed Tributary



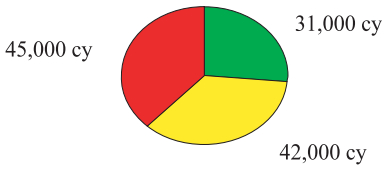
5. Niagara Mohawk - Cherry Farm/River Road



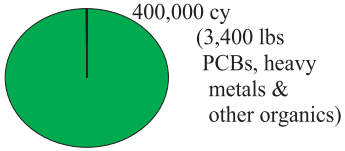
6. Gill Creek



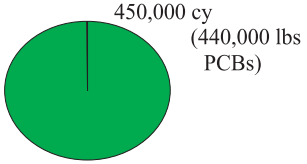
1. Manistique River and Harbor

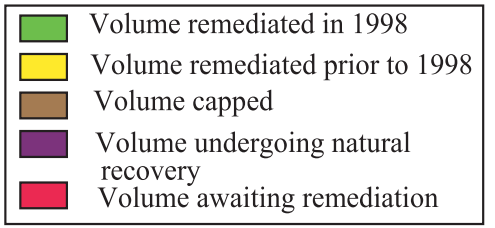


2. Newburgh Lake



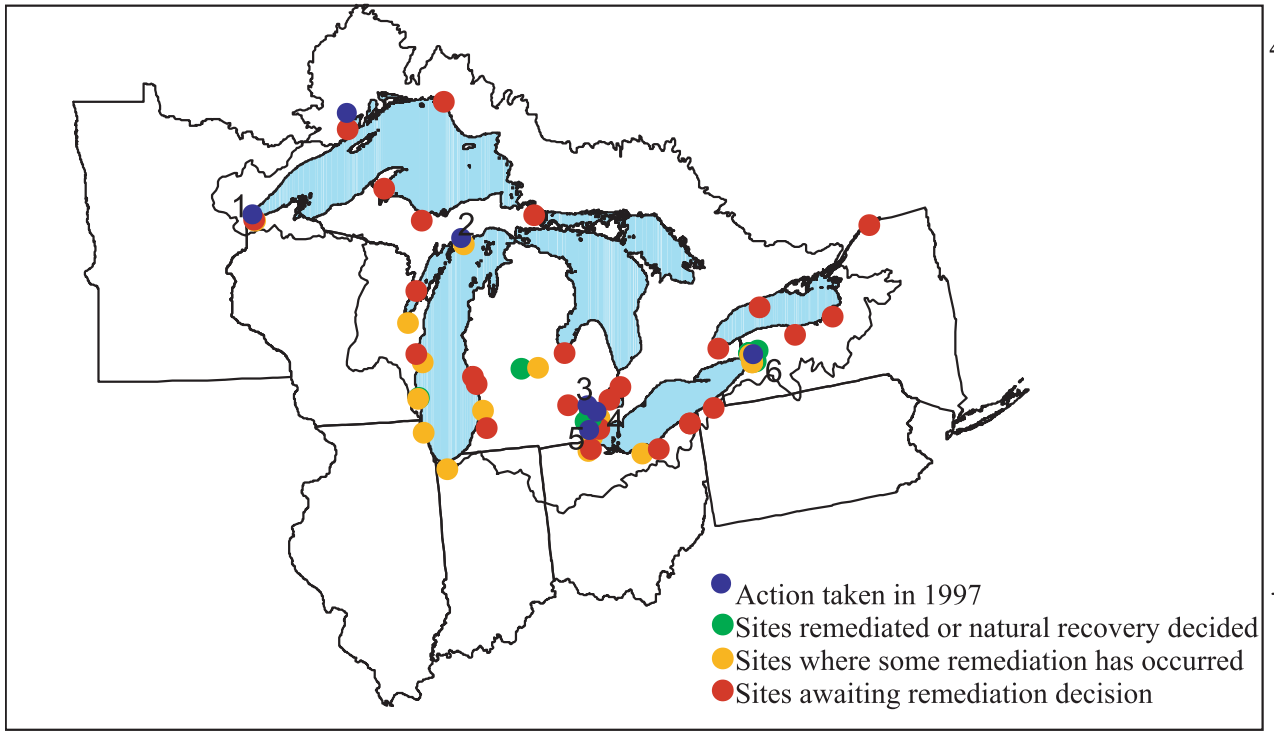
3. Willow Run Creek



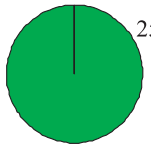


Great Lakes Sediment Remediations in 1997*

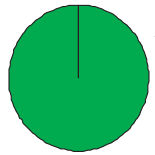
*Information included in the map is quantitative *as reported* by project managers. No attempt has been made to evaluate chemical data quality or verify calculations of mass removed.



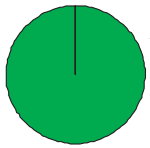
4. Monguagon Creek



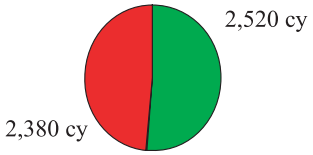
5. River Raisin
Ford Monroe Outfall



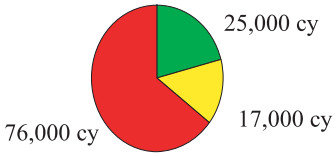
6. Niagara Transformer



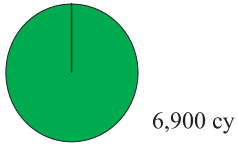
1. Newton Creek/
Hog Island Inlet

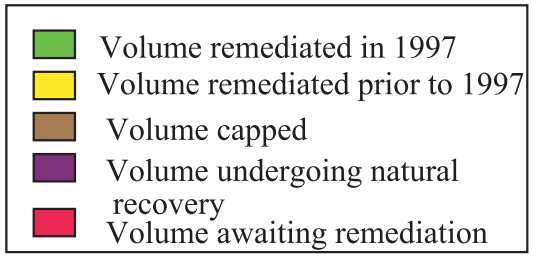


2. Manistique River and
Harbor



3. Evans Product Ditch
Upper Rouge River





8.0 LONG-RANGE TRANSPORT CHALLENGE

Canadian Workgroup co-chair: ***S. Venkatesh***

U.S. Workgroup co-chair: ***Todd Nettesheim***

Under the Great Lakes Binational Toxics Strategy, EC and the US EPA committed to:

"Assess atmospheric inputs of Strategy substances to the Great Lakes. The aim of this effort is to evaluate and report jointly on the contribution and significance of long-range transport of Strategy substances from worldwide sources. If ongoing long-range sources are confirmed, work within international frameworks to reduce releases of such substances."

In support of this challenge, the U.S. and Canada have:

- Maintained the Integrated Atmospheric Deposition Monitoring Network (IADN);
- Improved the integration of monitoring networks and data management;
- Continued research on the atmospheric science of toxic pollutant transport; and
- Worked through existing international frame works to reduce releases of Strategy substances and better assess the significance of long-range transport.

Long-Range Transport Workshop - September 16-17, 2003

The US EPA and Environment Canada, with the support of the Commission for Environmental Cooperation, the International Joint Commission, and the Delta Institute, held a workshop on the long-range transport of toxic substances to the Great Lakes on September 16-17, 2003, in Ann Arbor, Michigan. The workshop was organized in response to a challenge within the GLBTS to evaluate the contribution and significance of long-range transport of toxic substances from worldwide sources to the Great Lakes. Drawing on both a commissioned background paper and over 70 experts from around the world, the workshop reviewed the latest research on the global fate and cycling of persistent toxic substances, identified critical knowledge gaps, and provided recommendations on future activities necessary to adequately address long-range transport.

Some of the more significant findings from the workshop include the need to harmonize the sampling intervals and methods of monitoring networks, the urgency to establish sentinel sites to assess the trans-Pacific transport of persistent toxic substances, the utility of passive air samplers as an inexpensive method for assessing persistent organic pollutants (POPs) in source regions, the importance of model inter-comparisons to evaluate a number of different models for consistency and reliability of model results, the use of newly available models to assess the long-range transport potential of substances to the Great Lakes, and the need to improve the transparency and accountability of emission inventories for persistent toxic substances.

The workshop planning committee has prepared a draft document that summarizes the workshop deliberations and recommendations for sustaining and expanding research on long-range transport of persistent toxic substances to the Great Lakes. The draft document contains recommendations under the categories of emissions inventories, monitoring, and modeling, and a final category puts forth recommendations that cut across each of these three research categories.

The draft document is currently under review by workshop participants and invitees. The commissioned background paper, the workshop's program, the workshop presentations, and the draft summary document are available on the Internet at http://www.delta-institute.org/lrtworkshop/open.html.

GLBTS – LRT Update 2003 – Canadian Activities

Impacts of Lindane Usage in the Canadian Prairies on the g-HCH Loadings to the Great Lakes Ecosystem (by J. Ma and S.M. Daggupaty, Air Quality Research Branch, Meteorological Service of Canada):

A modeling investigation has been conducted for assessing the magnitude of, and spatial and temporal variability of the atmospheric deposition of g-HCH (lindane) to the Great Lakes. A three-dimensional atmospheric transport model able to simulate transport and loadings of organochlorine (OC) pesticides has been applied to g-HCH (Ma. et. al., 2003a). The modeled air and soil concentration distributions revealed that lindane usage in the Canadian Prairies' canola fields was a major

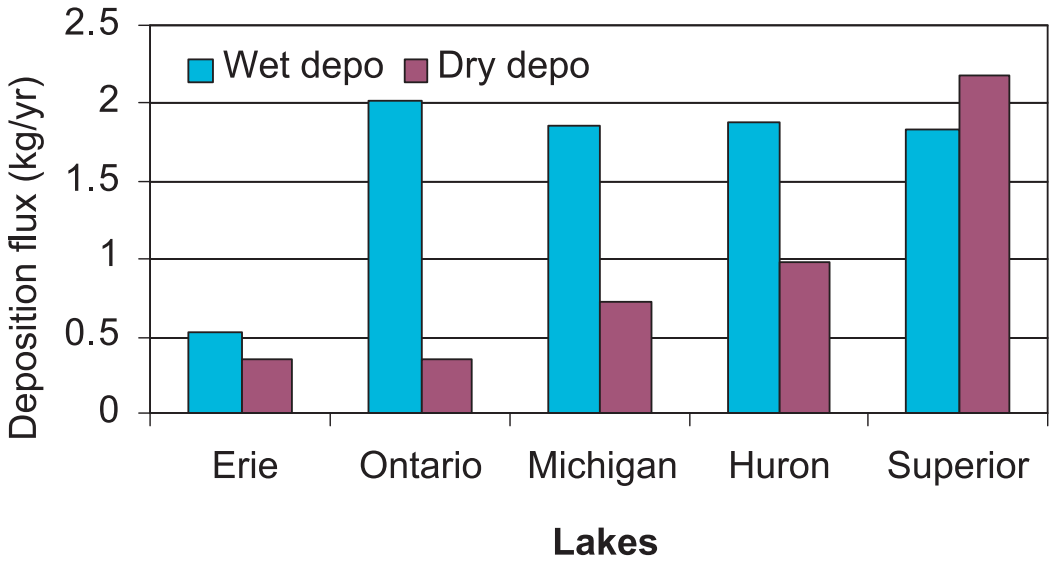


Figure 8-1. **Model-estimated Annual g-HCH Wet and Dry Deposition Fluxes (kg yr-1) to the Great Lakes from May 1998 to April 1999.**

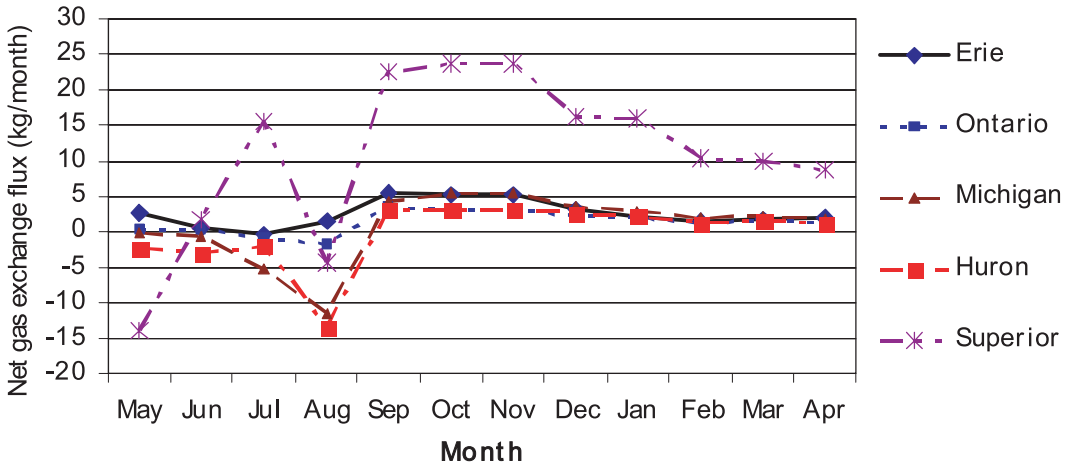


Figure 8-2. **Model-estimated Monthly Variation of g-HCH Net Gas Exchange Flux (kg month-1) across Interface between Lake Water and Air from May 1998 to April 1999.**

contribution to the budget of g-HCH concentrations in the Great Lakes ecosystem relative to usage in agricultural regions of Ontario and Quebec. This is due primarily to large lindane usage in the Prairies upwind of the Great Lakes. Accordingly, modeling results (Ma et al., 2003b) indicate that Lake Superior received the highest dry deposition load of 2.17 kg yr-1 from May 1998 to April 1999, followed by lakes Huron and Michigan (Figure 8-1). Dry deposition to the lower Great Lakes (lakes Erie and Ontario) was 2 to 6 times lower compared to the upper Great Lakes. Greater deposition in the upper Great Lakes is attributed to their larger water surface area and greater proximity to (Prairies) sources of g-HCH. The highest g-HCH loading (kg yr-1, in 1998-99) due to wet deposition occurred for Lake Ontario, due mainly to greater annual rainfall over Lake Ontario. Averaging seasonal fluxes predicted by the model shows that deposition fluxes to the Great Lakes are considerably higher in the summer than those in the autumn and winter seasons. The net direction of gas exchange also exhibits a seasonal dependence. Lakes Michigan, Huron, and Ontario showed net absorption in the summer 1998 whereas at all other times, net out-gassing occurred at all of the lakes (Figure 8-2). Overall, gas-exchange was the dominant process affecting loadings to the Great Lakes. Model-derived loadings and total deposition flows across the Great Lakes basin due to dry and wet depositions, and to net gas exchange agreed reasonably well with summer estimates in 1998 compiled by the Integrated Atmospheric Deposition Network (IADN).

References

Ma, J.; Daggupaty, S.M.; Harner, T.; Li, Y.F., Impacts of Lindane Usage in the Canadian Prairies on the Great Lakes Ecosystem - 1: Model and Modeled Concentration in Soil and Air, *Environ. Sci. Technol.*, 2003a, 37, 3774-3781.

Ma, J., Daggupaty, S.M.; Harner, T.; Blanchard, P., Impacts of Lindane Usage in the Canadian Prairies on the Great Lakes Ecosystem - 2: Modeled Fluxes and Loadings to the Great Lakes, *Environ. Sci. Technol.*, 2003b, in revision.

Global/Regional Atmospheric Heavy Metals Model (GRAHM) – Update (by A.P. Dastoor, Air Quality Research Branch, Meteorological Service of Canada):

During the period 2002-2003, Canadian efforts continued on further development, testing, and application of the global model for atmospheric transport of mercury (GRAHM – Global and Regional Atmospheric Heavy Metals model). A journal paper on the model has been accepted for publication (Dastoor and Larocque, 2003). The following studies were conducted with the GRAHM model.

1. GRAHM was applied to estimate the source contribution of continental scale emissions (anthropogenic, natural/re-emissions) to mercury deposition at receptor regions. Source regions considered were Canada, USA, Europe, and Asia. Contributions from global, natural, and re-emissions were also estimated separately. The receptor regions are Canada, USA, Europe, and Asia. The results show that there are significant continental scale contributions to these receptor regions and that a significant fraction of deposition comes from the natural and re-emissions of mercury. The results will be discussed in detail in upcoming publications.
2. GRAHM was used in understanding the impact of the rapid, near-complete depletion of mercury that has been observed during spring in the atmospheric boundary layer in the Arctic, sub-Arctic, and Antarctic regions. This depletion is also correlated with ozone depletion in the same areas. Recent studies have provided a possible chemical mechanism for such a fast oxidation of elemental mercury by halogen gases in the Arctic environment. The mechanism describing the Arctic mercury depletion cycle was included in GRAHM, and the impact on mercury deposition in the Arctic as well as on the global scale was estimated. The main conclusion from this study is that mercury depletion events in the Arctic increase the net deposition of mercury into the Arctic by about 100 tons/yr, which is an approximate 44% increase to the annual deposition of mercury in the Arctic without the depletion events.
3. GRAHM was one of several candidate models that participated in a European Monitoring and Evaluation Program (EMEP) mercury models intercomparison study. Model results were compared with observations of 1-2 week episodes from a Swedish/Canadian/German field campaign - TRANSECT 1995 - and from the European Union Environment & Climate project "Mercury Species over Europe (MOE) 1999". Under the authority of the Convention on Long-Range Transboundary Air Pollution on Heavy Metals, Meteorological Synthesizing Centre – East (MSC-E) was given the responsibility for calculating transboundary fluxes and depositions of heavy metals in the EMEP region. This intercomparison study of models was considered an essential prerequisite for the development and application of operational models for heavy metals. The main conclusion of the study is that models are capable of estimating air concentrations of elemental and particulate forms of mercury but that reactive gaseous mercury is poorly reproduced by the models. This is partly due to our present lack of understanding of the chemical composition of measured reactive gaseous mercury.
4. A regional version of the model is being developed for more detailed studies.

Reference

Dastoor, A.P. and Y. Larocque, 2003: Global circulation of atmospheric mercury: A modelling study. Atmospheric Environment, (in press).

Lake Michigan Sunset
Leland, Michigan
Photo by: Michigan Travel Bureau